# CS 375: A Climate-First Approach to Training Student Teaching Assistants

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Acknowledgement

To Dan Garcia, thanks for being incredibly supportive and helpful throughout the years. To Armando Fox, thanks for all of the guidance and resources; I could not have done this without you. To Lisa Yan, thank you for all of your thorough and detailed feedback while I was putting everything together. And to my parents, thank you for your patience. It’s been a long journey, and I hope it only keeps going!

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by

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Submitted to the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley, in partial satisfaction of the requirements for the degree of **Master of Science, Plan II**.

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Abstract

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Master of Science, Plan II in Electrical Engineering and Computer Sciences

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Student teaching assistants (TAs) are essential contributors to CS education and are often the first point of contact for many students. Given increasing evidence that student achievement is directly correlated to a positive classroom climate, an effective TA must possess not only strong domain and pedagogical skills, but also the skills necessary to maintain an inclusive, welcoming, and supportive classroom environment. Our view is that there is no meaningful separation between pedagogical and climate skills: rather than "compartmentalizing" climate into specific workshops or modules of a course, our semester-long required TA preparation course treats classroom climate as a lens through which traditional pedagogical skills are viewed, such as giving presentations that encourage participation, creating equitable assessments, and creating successful student groups by fostering belonging. We describe a climate-first, scalable, modular TA training curriculum with open-source and curated teaching materials, suitable for in-person or remote instruction, that serves hundreds of first-time TAs each year, and which student feedback suggests is meeting our goals.

# Contents

# Chapter 1

# Introduction

First-time TAs, both undergraduate and graduate, require professional training for their first teaching appointment. Especially in large-enrollment courses, TAs will have many more interactions with students than instructors will, and will often be the first point of contact for students, both for the course material itself, as well as classroom climate-related issues. At our institution, exploding demand for Computer Science (CS) has resulted in a large majority of "near-peer" undergraduate TAs, sometimes only one semester removed from when they took the course they are teaching.

Our view regarding this training is that there is no meaningful separation between pedagogical skills and climate skills. Indeed, there is increasing evidence that in addition to "traditional" pedagogy, student achievement is directly correlated to a positive classroom climate [9, 12, 17, 19]. Therefore, rather than relegate climate skills into specific modules, we bake climate-related issues directly into how we teach pedagogical skills. In this way, we attempt to ensure a baseline level of both pedagogical and climate competency among all teaching staff, and to disrupt the status quo by providing a bottom-up approach to systemic climate improvement.

Our course focuses on a Teaching Assistant (TA) role, defined as a student who is:

- a matriculated undergraduate or graduate student in a degree program that is the same or adjacent to the program in which they are teaching;
- holding a teaching appointment officially granted as part of an application process and officially recognized by their department via academic credit, monetary compensation, or both; and
- in charge of leading a classroom for one or more small-to-medium sections of a course, even though they may have additional responsibilities such as creating or curating materials, grading exams, holding office hours, and so on

We do not differentiate between graduate and undergraduate TAs, whom we expect to have equal responsibilities.

Our main contribution is a novel, scalable, modular curriculum for climate-focused pedagogy training, supplemented by open materials freely available to other instructors[1,2]:

- **Climate-first:** rather than an orthogonal concept, climate is a lens through which traditional pedagogy topics are viewed and taught
- **Interactive:** most modules include an interactive activity that draws from TAs' own ongoing or past experiences
- **Modular:** each course module is largely self-contained, and most can be used in any order
- **Scalable:** our course trains over 70 first-time TAs each semester and each summer, most of them undergraduates, who teach courses with 200-1000+ students

Our hope is that this framing and organization encourages others to both adopt and further contribute to these training modules.

## 1.1 Related Work

A systematic literature review of undergraduate TA programs [11] was done in 2019. The extracted TA duties contain only topics related to "traditional" pedagogy (e.g. "oversee and mentor project groups", "check for assignment completion", "hold Office Hours on a weekly basis"). Issues related to classroom climate are not mentioned explicitly anywhere in this review; instead, they are only mentioned obliquely in qualities to look for in a TA: ("friendly, helpful, "concerned about the welfare of their students"). Indeed, when discussing what is missing from the literature, they mention the need for further study on the impact of such programs on underrepresented students.

Not too soon after, Washington presented the clear and present need for Cultural Competence in the undergraduate computing departments, as well as the lack of formal courses to focus on these issues [18]. This position paper and its findings provide further motivations for creating this climate-first training program for TAs.

Mount Holyoke College has developed a climate-focused curriculum for near peer mentors to great success [13], and shares many of our goals and approaches. It also seeks to modularize topics, and approaches the topics from a climate-first lens. This training is offered prior to the mentors working with students, and is geared towards students mentoring small groups of peers. By contrast, our course is taken concurrently with a teaching appointment, and is geared towards those who are expected to lead a discussion section.

A few of our peer institutions[3] that must train large numbers of TAs to staff high-enrollment courses vary in the amount and type of required preparation, and the target

[1] https://bcourses.berkeley.edu/courses/1516384/modules

[2] https://drive.google.com/drive/folders/1aXS88ik-Ui8KcNIYfaO6CvYhXWOOfeoU

[3] Institutions surveyed: Carnegie Mellon University, Cornell University, Georgia Institute of Technology, University of Texas, Austin, and Univesity of Washington

audience. Two offer 1-hour weekly training that continues through most or all of the class term; three others require a few hours (3-8) of training at the beginning of their appointment, supplemented by optional additional sessions. All have either highlighted the need for better consistency, or are actively in the process of restructuring their TA training. As of writing, none of the surveyed institutions have adopted a climate-first approach to TA training.

A few of our in-class activities are inspired in part by a game Colleen Lewis created to learn about microaggressions [10]. Indeed, at the University of Illinois Urbana-Champaign, Colleen has independently developed a training course[4] for "course assistants" (a mix of tutors, undergraduate TAs, and graders). This course almost exclusively focuses on interpersonal interactions and fostering an inclusive and welcoming environment. Our course, by contrast, also includes prescriptive material (e.g. giving presentations or writing exams), and places an emphasis on being run synchronously.

[4]https://tinyurl.com/UIUC2021TACourse

# Chapter 2

# Course Overview

Our course specifically targets TAs and runs the full semester, concurrently with their first teaching appointment, as an additional goal is to provide support and feedback to TAs *throughout* their teaching appointment. It meets once a week for 2 hours during the 15-week semester. Our enrollment each semester ranges from 70 to 100 first-time TAs, typically 80+% of whom are undergraduates. A typical class meeting runs as follows:

- 40-60 minutes: lecture/didactic content
- 20 minutes: student group activity and discussion
- (Optional) 10 minutes: break
- 30 minutes: debrief group activity, class-wide discussion

The course also includes a few assignments to do outside of class time, including peer observation, requesting student feedback, and regular self-reflections.

We have taught the class both in-person and remotely. In the in-person format, we try to get a room in which small groups sit around tables, rather than in rows of chairs. In the remote format, we use virtual breakout rooms for the group activity. In both cases, TAs are grouped at the beginning of the course by the class they are teaching, providing both continuity with a peer group throughout the semester and commonality for discussing their experiences.

Table 2.1 details the topics and activities covered in each meeting. The concepts introduced in the "classroom climate" module form a common refrain that reappear in all modules in the course (in fact, we also reveal in this module that the previous modules are also viewed through this climate lens). Much of the course material generalizes beyond CS, but any applications provided are related to the CS classes the TAs are teaching. For example, helping students is often framed in the context of reading or debugging student code.

| **Module name** | **Specific topics** | **Interactive exercises** |
|---|---|---|
| Introduction and first-day prep | Common teaching fears; growth mindset; ideas to structure class; tips for first day | One thing that excites you, one thing that worries you |
| Presentation and answering questions | Boardwork/slide tips; when to answer with a question; how to ask for questions | Debrief your first week; tongue twisters; Rephrasing exercise |
| Classroom climate | Stereotype threat; imposter syndrome; expert blindness; Diversity, Equity, Inclusion, Belonging (DEIB) | Ideas to improve climate (which of DEIB does each idea affect?) |
| Flipped classroom and peer instruction | Eric Mazur on peer instruction; pair programming; the (lack of) value of lecture | Why is university better than self-study in a library? |
| Assessments | Bloom's taxonomy; SOLO taxonomy; inclusive content; dry-running an exam | 5 criteria for a good exam (question) |
| Handling academic dishonesty | Hierarchical framework to handle academic dishonesty | What is academic dishonesty? Why do students cheat? How can we stop cheating? |
| Unconscious and implicit bias | Demographics in Computer Science; mitigating bias; actions to take | Discussion: what are your biases?; Bias scenarios: how would you intervene? |
| Surveys and feedback | Reasons people TA; meeting expectations; course enjoyment vs value | |
| Proctoring and accommodations | Integrity "vs" accommodations; students with disabilities; remote proctoring | Why do we need exams? |
| Teams and study groups | Team formation; what makes a good group; measuring group health | Debug the student, not their code; your experience working in groups |
| Microaggressions | Identifying and addressing microaggressions; ACTION framework | Witnessed microaggressions; case studies to address microaggressions |
| Accessible course content | Accessibility benefits everyone; universal design; tools for accessible design | Accessibility audit of your course's website |

Table 2.1: Each module is the subject of a weekly 2-hour meeting, whose breakdown is described in the text. Modules after the first three are meant to be chronologically interchangeable (the order listed is the order in which we typically cover them).

## 2.1 Lecture

Each meeting begins with a modest number of slides to frame discussions. For climate-centric topics, such as stereotype threat, we present relevant background and summarize recent research on the topic. For example, we show that stereotype threat is incredibly easy to induce [1, 15], or that something as simple as who asks the first question can have an outsized effect on participation [3]. For pedagogy-centric topics, we try to identify actionable "nuggets" of research-supported pedagogy. For example, Mazur's "think–pair–share" is a widely-used form of peer learning [4] in our large lecture courses, yet most students are unaware that large-scale surveys of peer learning have identified an "optimal workflow" for using it in the classroom. Figure 2.1 shows our reconstruction of a flowchart capturing that workflow, adapted from the survey article itself [16]. Similarly, TAs may create single-answer multiple choice questions (MCQs) for an exam without being aware that three options are optimal in terms of maximizing information about what the student knows on the exam [14], or that there is only one grading formula that allows fair partial credit without rewarding or severely penalizing guessing when the MCQ has exactly one correct answer, but we want to give partial credit if the student narrows it down to one of N possible answers [6].

In both cases, the goal of the didactic content is to set the stage for the interactive group exercises, which students uniformly report as being among the most valuable elements of the course.

## 2.2 Interactive group exercises

The activities in class range from improv exercises to overcome stage fright and improve diction, to bringing positive and negative examples of exam questions from previous offerings of their course to help them write their own questions, to discussing scenarios with climate related issues. TAs are encouraged to bring both their experience as a student, and as a (new) TA, to group discussions. In some scenarios, TAs discuss how to react to a particular incident; in other cases, different students in the group take on different roles to act out a scenario (disruptive student, student who struggles regardless of time spent in class and office hours, student who dominates discussions, etc).

Once the goals and scaffolding for the group activity have been presented, the instructor creates a world-writable Google Slides deck, and each group will create a single slide with a summary of the main points of their discussion. Limiting the contribution to one slide helps the groups succinctly summarize their points. We have been consistently impressed at how actively engaged (and loud!) the students can get during these discussions with their peers.

While the groups are working and editing their slides, the course instructor is constantly monitoring the Google Slides deck and capturing common or noteworthy points that appear. The instructor will then facilitate a discussion of these points, identifying common themes that emerged and asking individual groups to comment on unique contributions.

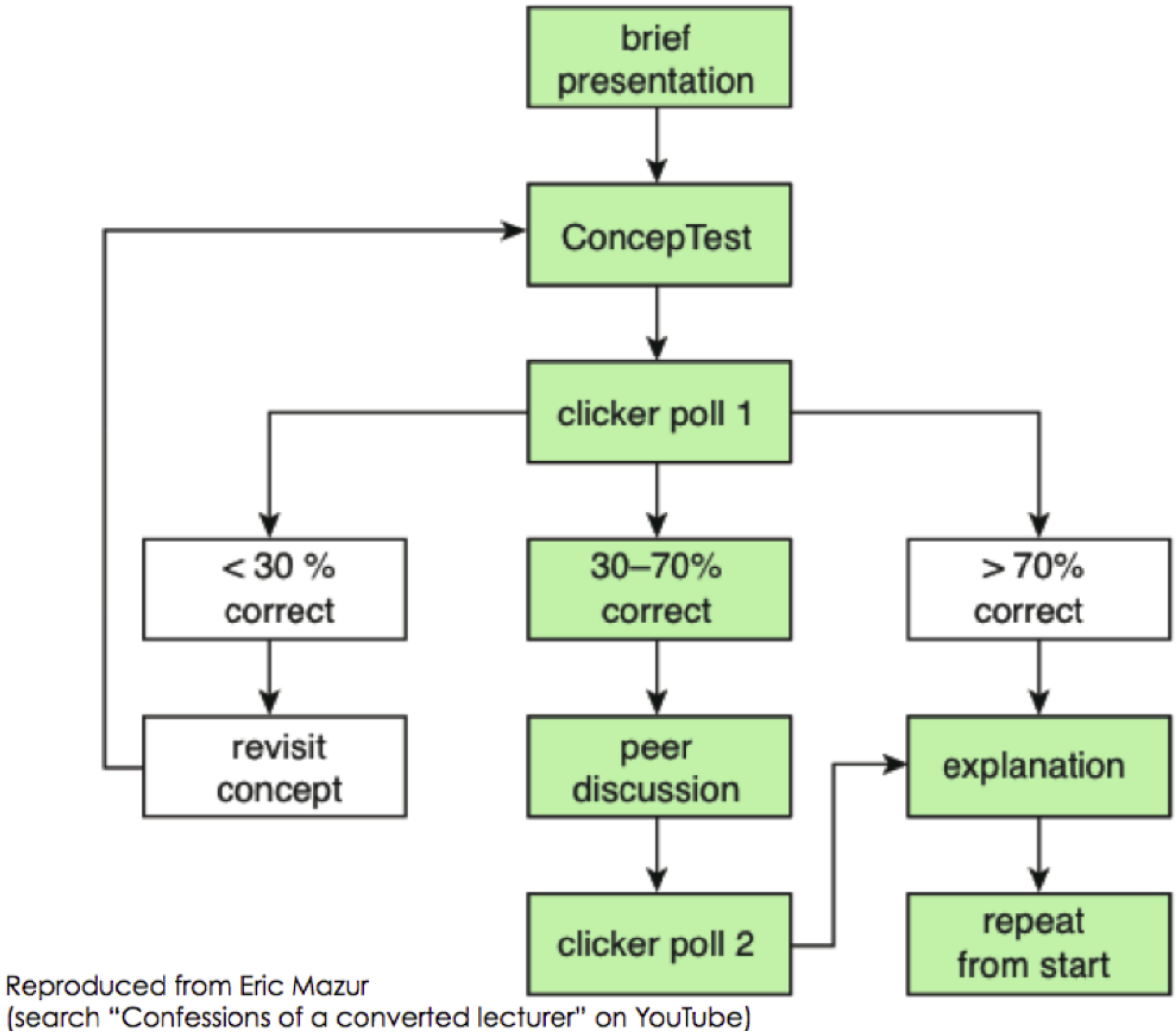


Figure 2.1: A visualization of a typical peer instruction session

This method of debriefing is faster and more scalable than having every group report back in turn, and has the added benefit of working well in remote formats.

## 2.3 Assignments

### Self reflections

After a TA finishes a section, they must write a self reflection according to a template:

- List one thing that went well
- List one thing that could have gone better
- Category-specific topics such as presentation, classroom climate, etc

TAs must rate themselves on several subpoints within each category (for example, "How confident are you that your handwriting was legible?"), and brainstorm ideas for how to improve in each category. As the semester progresses and the TAs get more comfortable writing, use of the template is no longer required, and the TAs can reflect in a free-form manner.

Each week, the instructor reads through the TAs' reflections and celebrates successes, and also summarizes common pain points, along with suggestions for addressing them, as part of that week's lecture. This provides a level of immediacy and applicability, allowing TAs to get close-to-realtime feedback on their teaching.

**Optional extension (resource-permitting):** to mitigate the workload this puts on the instructor, this course can optionally itself take TAs or readers to create these weekly summaries. This added staff can also reply to the self reflections, providing the TAs individualized feedback. While harder to scale, we highly recommend adding this if possible. In two different offerings, we gave students a survey asking them to rate the effectiveness of the feedback they received on a scale of 1 (least effective) to 10 (most effective). For the offering with only the weekly summary, students gave an average rating of 6.51 (n=53), whereas for the offering with individualized feedback, they gave an average rating of 7.14 (n=56).

### Video peer observations

The TAs in this course must pair up and observe each other teaching. In addition to filming their partner, they will also fill out a peer observation form (very similar in format to a self reflection), where they leave notes for their partner, citing things they liked, as well as giving suggestions for improvement.

This observation happens twice throughout the semester: once at the one-third mark, and again at the two-thirds mark. The observations are spread apart so as to give time for the TAs to implement and practice changes between recordings.

## Mid-semester survey

Lastly, the TAs must conduct a survey with their students. We give a few suggestions for what to ask (pacing, clarity of explanations, difficulty, etc), but ultimately, the format of this survey is left to the TAs' discretion. Their submission for this assignment is to list at least 3 things they learned from their survey, and to include a summary of how they plan to address the feedback with their students (What do people like? What changes will they make, if any? etc).

# Chapter 3

# Examples of Climate-First Pedagogy

However strong a teacher may be, it will not matter if the students do not want to come to class. It is therefore critical to frame material from the perspective of making students feel comfortable and welcome while in class. In this section, we choose three examples from Table 2.1 to illustrate our approach to combining climate and pedagogy: Presentation and answering questions, Surveys and feedback, and Teams and Study Groups.

## 3.1 Presentation and answering questions

Unsurprisingly, how a teacher engages with their students directly affects student engagement in class. This module stresses how a good presentation not only consists of clear delivery and articulation, but also thoughtfully-phrased content and frequent interactivity within the class (despite potential protestations from the class about having to actively participate [5]).

The lecture portion covers some background and advice that combines climate and pedagogy. For answering student questions, the first two pieces of advice we give are (1) do not interrupt students, and (2) you don't have to know the answer. We set the tone right away that the focus should not be on the teacher, but rather on encouraging student participation: leading a student to the correct answer is more important than giving it to them. Thus, *how* the teacher leads them there is often more important than whether they actually know the answer!

We also emphasize the importance of phrasing. Active learning cannot occur if students do not feel comfortable participating. We begin with a few examples of how to rephrase statements that can discourage students from participating. For example, instead of prefacing an explanation with "you should know this from lecture," saying "this was mentioned in lecture" may be less likely to intimidate students who *did* hear it in lecture but are having difficulty understanding it. Similarly, "[statement] is obvious" may make a student who doesn't immediately understand [statement] feel like they don't belong; removing the phrase "is obvious" avoids this ill effect, and is less verbose as an added bonus.

This advice transitions into the class activity, where the TAs discuss the following questions in groups:

- What are some phrases you've heard or been told that didn't land right?
- What about them didn't feel right?
- How would you rephrase them?
- How is the rephrasing more inclusive?

By drawing from their own experiences, we use this exercise to empower our TAs with tools to be more deliberate in their phrasing when presenting material or answering questions, and therefore encourage active and comfortable participation from their students.

## 3.2 Surveys and feedback

An inclusive classroom is one in which students feel like their concerns are being heard. This means a teacher must not only gather feedback from their classroom, but also address said feedback with the class. This provides a level of accountability for the teacher, as well as an opportunity for the students to effect change.

The lecture models this desired behavior by presenting results from a survey for this course the TAs are asked to fill out in the week leading up to this class. Its questions include, among others:

- Why did you choose to be a TA?
- How has this class lined up with your expectations?
- What are some things you like about the course?
- What are some things you would change about the course?

This lecture serves a dual purpose: it uses the presentation on survey results as a means to teach the TAs how to give, interpret, and act on feedback[1], and also serves as a firsthand example of fostering inclusivity and belonging by directly incorporating TA feedback into the course itself. Going over the TAs' responses also helps drive home the importance of diversity: the varied (and sometimes directly contradictory) feedback means that the TAs must recognize that, like them, their students come from all sorts of backgrounds, and as such, will be better-suited to provide in-depth perspectives on student experience than the teachers.

For example, for "why did you choose to be a TA?", many TAs will answer along the lines of "I love teaching". But a good number of TAs will also answer "I need funding". It

[1]This module is intended to be run at the same time the TAs are conducting their own surveys (see 2.3).

is important to recognize here that this is not a lesser or invalid answer, but rather, this TA training class must account for differing motivations to be a good teacher (after all, being an effective teacher is the best way to get rehired, thus securing more funding!).

The lecture concludes with a list of commitments and changes we will make, either in the second half of the course, or in future offerings, to address the feedback students gave. This survey module has been conducted 10 times, and each offering has resulted in new changes, a fact that is shared with the TAs to emphasize that this course, like theirs, is a work in progress, and can always improve.

Unlike the other modules, there is no class activity, as we go into great depth into survey responses. For future offerings, we are considering an activity that uses the lecture portion to help the TAs build their own surveys.

## 3.3 Teams and study groups

Rather than diving into "traditional" pedagogy topics on group dynamics (distribution of work, relative student strength, and so on), we begin this module by sharing anonymized incidents that occurred while working on group assignments, as reported by members of historically-underrepresented groups within our department. These incidents include sexual harassment, retaliation, and discrimination by teammates. Our goal is to establish up front that while there are typical group dynamics issues that TAs must address, there is a much bigger issue that TAs must be aware of and actively combat: a non-trivial number of students will struggle to form groups in the first place.

In the lecture portion, we encourage our TAs to provide the resources for students to find group members that will make them feel safe and productive, and provide an example of how software can do this at scale [8]. This includes allowing students to volunteer identifying information about themselves so that the TAs can group students in a manner consistent with their backgrounds and preferences. We stress here that any such grouping *must* be done only through opt-in means: under no circumstances should students feel obligated to provide information about how they identify, nor should the teaching staff make guesses about student identities.

Next, we teach the TAs that a team's "intelligence" is not the sum of individual intelligence within the group, but rather is influenced most by the team's *psychological safety norms*: how well group members speak in turns, and how well each member understands how their statements will be received by the other members [20].

The lecture concludes by giving the TAs concrete ways to survey group health. For example, group members can, either after an assignment, or periodically throughout if it spans many months, on a 5-point Likert scale, answer the following:

- My contributions are encouraged and welcomed
- My teammates are mindful of how their remarks or reactions affect other group members' feelings

- If I make a mistake on our team, it is not held against me
- When my teammates say they'll do something, they follow through with it

The in-class activity asks the TAs to recall their own experience working in groups, and whether their experience is correlated to how they would have answered the questions above. The class ends with an open-ended discussion on how we can increase their students' likelihood to answer the questions positively.

## 3.4 Assessments

Writing good exams is a critical component of being an effective teacher. In addition to presenting Bloom's and SOLO [2] taxonomy for testing student understanding, this module covers how to write exam questions in an inclusive manner. The TAs are asked to bring two questions from previous exams for the class they are teaching: one they thought was a particularly good exam question, and one they thought was a particularly bad exam question. We start class by having the students share their questions in groups and ask them to come up with five criteria for a good exam question. When reconvening as a class, we highlight a few [7] that are often overlooked, and how they can influence equity:

- **Reasonable time:** the points allocated to a given question should be directly proportional to the time students are expected to spend on that question. Furthermore, we highlight the tradeoffs for timed vs untimed exams. Specifically, while an exam with unlimited time removes the stress of time management from students, it will indirectly disadvantage those who do not have an unbounded amount of time to spend on the exam.
- **Range of difficulty:** we caution that many first-time teachers will write exams that are too difficult. Specifically, if a question is *interesting* to the teacher, an expert in the material, it is almost certainly too difficult for the students. Here, we emphasize that writing questions that run the spectrum of difficulty benefits both teachers and students: it lets the teacher meaningfully differentiate their students, and gives the students the best opportunity to accurately demonstrate their level of understanding of the material.
- **Question variety:** in addition to comprehensively covering the material in the exam, *how* each question is presented matters. Just like with difficulty, having a diversity of question types (open-ended, parsons problems, multiple choice, etc.) maximizes a student's opportunity to demonstrate their understanding of the material.

Next, we discuss how, as with presentations, the *phrasing* of exam questions matters. We remind the TAs that while it is tempting to reference pop culture or current events in an attempt to make a question more interesting or entertaining, such references can negatively

impact inclusion. Those who are unfamiliar with the pop culture reference, or are disproportionately affected by the current event, will at best be mildly distracted or confused, and at worst be completely unable to meaningfully engage with the question. Similarly, we remind the TAs that questions with overly verbose setups (for example, a question that spends 80% of its text describing a fairy tale, and the remaining 20% on the relevant concept) disadvantage those who do not speak English as their primary language.

We bring this module full circle by telling our TAs to make questions more interesting or engaging not by using references that rely on cultural assumptions, but rather by targeting higher levels of the taxonomies. For example, rather than asking students to recall information from class ("what is the structure of an inductive proof?"), which could be looked up, we can ask students to apply that information ("use induction to show the following claim"). Not only does this avoid making students feel excluded, it also ensures that the full range of material and understanding is being assessed with the exam.

## 3.5 Academic dishonesty

In this module, we do a deep dive into academic dishonesty. As a class, we try to precisely define what constitutes academic misconduct, and whether it is meaningfully different from academic dishonesty. The class will quickly find that people's definitions can vary wildly, and indeed, the official definition provided by the university is intentionally ambiguous and open-ended, allowing for maximum leeway for interpretation and application of the term. With the realization that we have a general understanding of what constitutes academic dishonesty, but not a precise definition, we then launch into the class activity. In groups, students answer the following:

- Why do students cheat?
- What action to take when you suspect a student is cheating?
- What action to take when a student is caught cheating?

Once again, student answers here will vary wildly. Punishments range from immediately failing the course, to tiered punishments for repeat offenses, to doing nothing at all. Similarly, the supplied reasons for why students cheat vary anywhere from "students are lazy" to "students feel like they have to".

All of this feeds into a broader point this module hopes to make: this is yet another classroom climate issue. That is, an inclusive classroom should also remove the stressors and incentives for students to cheat. This can range from making notes and practice problems available to all students, to allowing and encouraging collaboration on assignments, to motivating students to learn the material rather than maximize their grade.

As a meta point, in this module, we also stress the importance of diversity within a teaching staff: these multiple and varied definitions of academic dishonesty, as well as the

philosophies for handling it, need to be well-represented within the staff to ensure course policies are fair to students.

We conclude this module by proposing the following hierarchical framework for handling academic dishonesty:

1. **Remove incentives:** while this is hard to do as first-time teachers, it is nonetheless helpful to think about how to do this. An example of this is allowing subsequent exam scores to replace previous ones.

2. **Create "cheat-resistant" assessments:** the next step is to reduce the number of ways students can possibly cheat. This manifests itself in two main ways. The first is to simply change the definition of what counts as cheating by relaxing the constraints (making the exam open-book, not recycling questions from previous exams, questions whose answers cannot easily be looked up). The second is to mechanically make it harder to cheat (randomize order of questions, randomize question parameters, physically space students out in the exam room).

3. **Create cheat detection mechanisms:** in-person, this is often the main priority for proctors. For online exams, many tools offer event analysis (e.g., key logging, or snapshots of the editor saved at regular intervals). These tools would easily detect if a student's answer is constructed by pasting in a large block of code (presumably sourced covertly from a friend or the internet), followed immediately by renaming all of the variables.

4. **Deal with detected incidents of cheating:** last, but not least, once incidents are detected, they must be handled. Ideally, course policy can deal with most incidents, and they can be escalated as necessary.

# Chapter 4

# Discussion

## 4.1 Student experience and results

We are interested not only in TAs' awareness of various climate-related issues, but also in their their self-perceived preparedness to detect and handle such issues if they arose in their classrooms. We performed an anonymous exit survey asking TAs to rate their awareness and readiness on a number of issues, comparing their state prior to taking the course with having just finished the course. TAs were asked to check all responses that apply. Responses with contradictory or bad-faith answers were removed. Possible answers to topics pre-course:

- This was not on my mind
- I was aware this was an issue, but didn't think much of it
- I was aware this was an issue, but didn't know what to do about it
- I was aware this was an issue, and I had a plan/strategy for what to do if I witnessed or was involved in an incident

Possible answers to topics post-course:

- This issue does not concern me
- This issue concerns me, but I don't know how to address or improve it
- I feel prepared to address or improve this
- I feel obligated to address or improve this

Due to a technical error, student responses for their state prior to the course in all categories but harassment and gender-based discrimination were lost. Nonetheless, regarding harassment, we see that the number of students who were unaware of the issue, aware but didn't think much about it, or aware but wouldn't know how to deal with it, dropped from 35

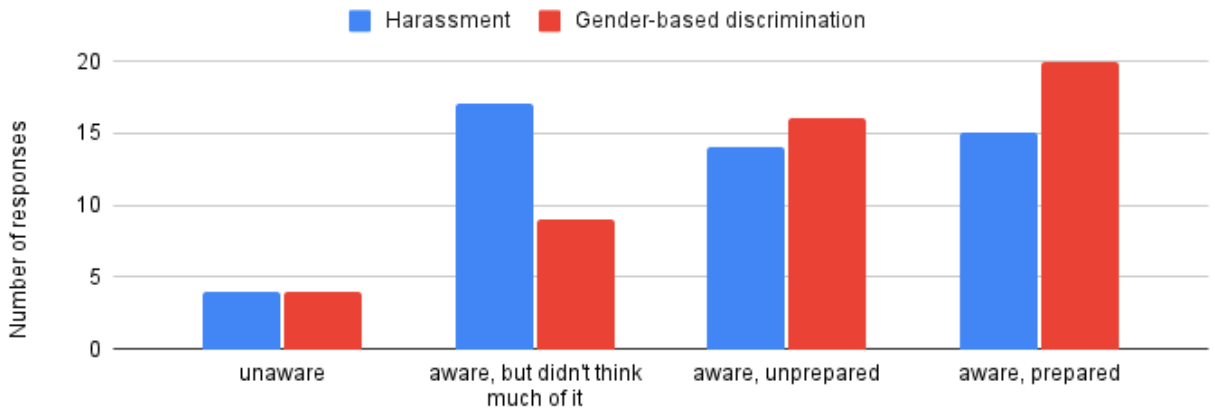


Figure 4.1: Student-reported awareness and preparedness for various climate-related topics prior to taking our course.

pre-course to 7 post-course. Similarly, the responses regarding gender-based discrimination dropped from 28 pre-course to 6 post-course.

The full results are presented in Figures 4.1 and 4.2. A clear and overwhelming majority of students either feel prepared or feel obligated to address and improve all the major climate-related issues we covered. We cautiously conclude that many of our first-time TAs have a strong desire to improve classroom climate, and at least on the topics of harassment and gender-based discrimination, our course had a significant impact on their awareness and preparedness to identify and handle such incidents.

Lastly, the survey allowed for open-ended comments. We include some qualitative feedback from students about their takeaways:

- "I really hadn't put any thought into making course materials accessible before. I think, going forward, I'll prefer web-based materials (rather than, for instance, scanned papers or textbook chapters)... I'll also take a more liberal approach to accommodations. Giving accommodations with [university policy] is following the law, but it isn't necessarily equitable."

- "I think I am going to just pay way more attention to the little things while I teach. Because we have been introduced to all of these topics, I am now aware of all the possible struggles students are facing and all the mistakes that I am possibly making, so overall I am just going to pay more attention to my teaching style and the accessibility of both myself and my teaching materials."

- "I plan to include more gender neutral and gender diverse examples in my teaching; it's important to represent all students."

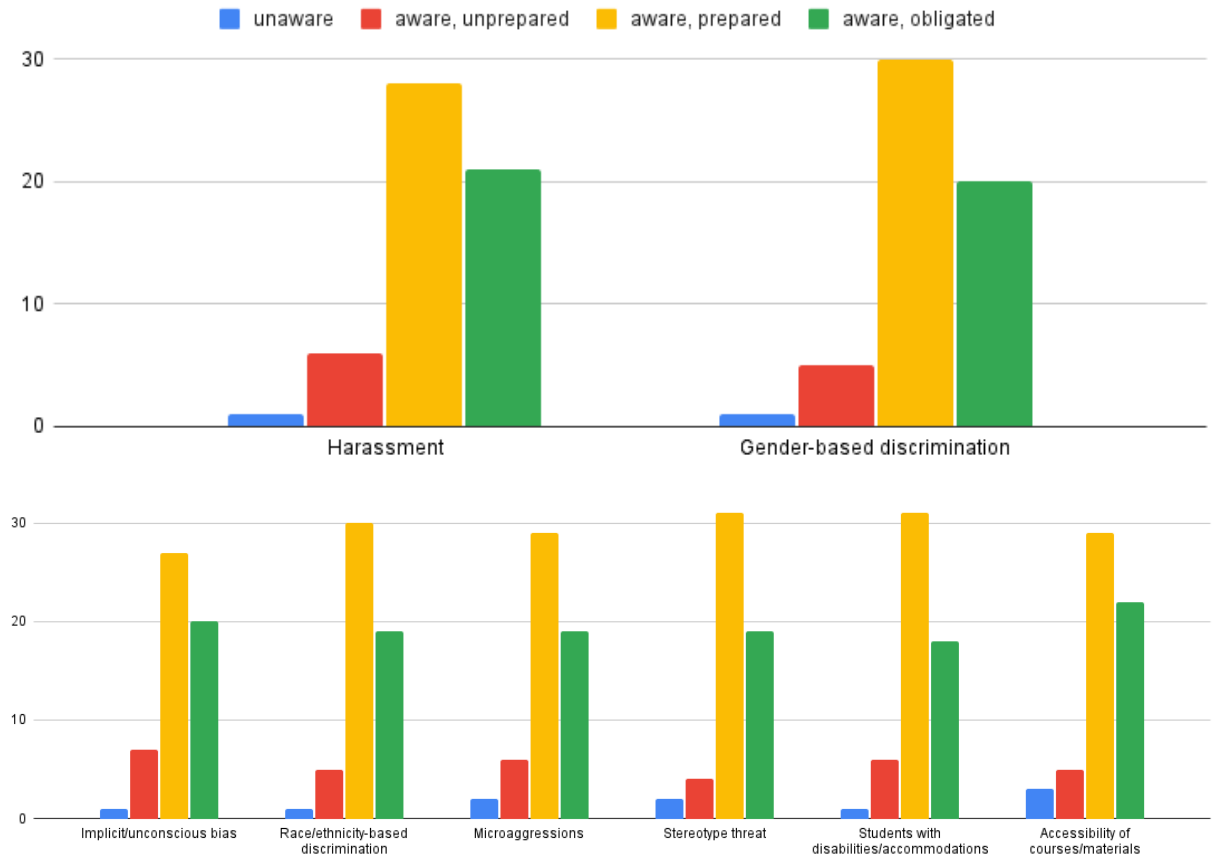


Figure 4.2: Student-reported awareness and preparedness for various climate-related topics after taking our course.

## 4.2 Scalability and adoptability

### Scalability:

The explosion in demand for CS classes (at our institution, CS enrollments have increased tenfold in a decade and a half) has led to an ever-greater need for student teachers. As a result, the course described here typically must accommodate 80 to 120 students each Fall and Spring semester, and 60 to 70 students when offered in the Summer (for TAs whose first time teaching is in a summer course).

The format of the course, in which interactive activities focus around small groups of TAs from the same or topically-related courses, along with debrief sessions, where the instructor reviews and highlights thoughts from each group, allows us to scale while still giving the TAs opportunities to meaningfully interact with peers. And because groups stay fixed throughout

our course, the TAs are able to build relationships that last beyond the semester.

## Adoptability:

Another important component of designing this course was to make it reproducible and consistent when different instructors are in charge of it. At our institution, it's common for the teaching of the pedagogy course to be a rotating "service role." We compared survey results across two different offerings of the course with the same material, but with different instructors. The survey in both offerings were identical: it was conducted at the halfway point in the course, and the students submitted their responses anonymously. In Figure 4.3, we show histograms for student responses to the question, "How beneficial has this class been for your teaching?", with 1 being useless, and 10 being most useful. While the two instructors had worked together on the course in the past, these results offer some evidence of course consistency.

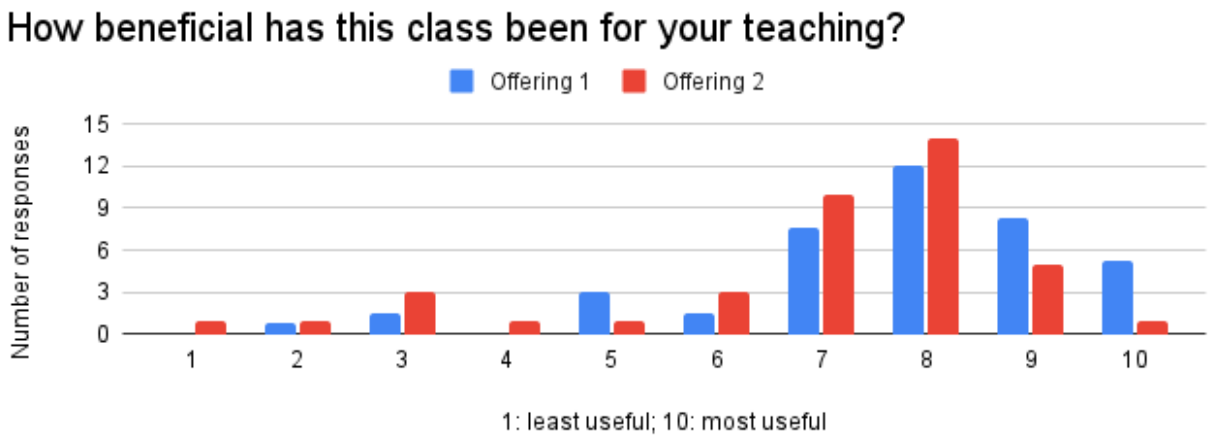


Figure 4.3: Student-reported usefulness of the course across two offerings with different instructors.

## 4.3 Future Work and Conclusions

While the surveys across two offerings yielded consistent results, the second instructor shadowed many classes run by the first, and was consulted frequently in the generation of the course content. Further offerings with different instructors will be needed to strengthen our claim of reproducibility.

Future offerings of this course will also include more granular questions in the exit survey, allowing us to gather more data regarding the various climate issues taught in the course. We are also interested in this course's effects on group dynamics in the TAs' courses, and will also include questions about their experience managing groups.

Lastly, we will continue to gather quantitative and qualitative evidence for our "climate-first" approach to pedagogy, improve our modular curriculum, and invite others to collaborate with us to adopt and improve it.

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# Appendix: Course materials

## Section I: Course Reader

This section is the compiled course notes which detail the contents that are presented in this course.

## Section II: Course slides

This section contains the slides (Summer 2023) that are presented in class. Note that week 5 (2/2) is withheld for student privacy, as it contains survey results with quotes from students.

# Section I

Course Reader

# Introduction: CS 375

The main purpose of this course is to discuss best teaching practices for teaching assistants. Just as most of your learning in your classes happens while you are working on the homeworks, labs, or projects, most of your learning for CS 375 will happen while you are actually teaching your class. In that vein, CS 375's goals are to demystify teaching by breaking it down into quantifiable skills you can improve over time, provide you a space to share your experiences with the other first-time TAs to discuss new perspectives and scenarios (and how to account for them), and equip you with ways to think critically and about your own teaching. Ultimately, we want you to genuinely enjoy teaching!

**This class assumes you are teaching a discussion or lab.** If you are a content TA or otherwise are not teaching a class, it is highly recommended that you take CS 370 or delay CS 375 until a future semester that you are regularly leading a class.

## Class structure

Each week will focus on a different main topic. These topics are not intended to make you an expert in them. In fact, many of the lectures are intended to reveal how little you (and sometimes us, too!) know about the topic at hand, and also entice you to explore it further. This theme of not knowing all the answers and wanting to learn more will be a recurring theme throughout the semester.

Before diving into the topic, each class will start with a quick recap of what happened in everyone's classes the previous week, along with some general advice to address any issues that arose. The topic itself will also be broken down into two components: lecture and group activity.

Broken down by time, here is the intended distribution for class:

- **(10%)** Weekly recap
- **(40%)** Lecture
- **(40%)** Group discussion
- **(10%)** Discussion recap

### Group discussion

After we present the material, we will ask several open-ended questions for discussion. You will be grouped by the classes that you are teaching to better anchor the discussion around similar experiences. There will be a shared slide deck, and each group is responsible for creating a slide.

Class will end by the instructors presenting each group's slide[1], summarizing common answers and asking followup questions as necessary.

[1] We have found that this approach to be better than having each group (or a subset of groups) present. This is because having each group present takes a lot of time, especially when multiple groups answer similarly.

## Class participation

When we have figured out how to get students to consistently (and voluntarily) have discussions outside of class (and not, say, get distracted, often justifiably, by their other classes or life responsibilities), we can consider creating a forum and moving the class to an asynchronous format.

Until then, *attendance will be required*, and class will be held synchronously. The expectation is that we will claim your full attention for the duration of class, but any time outside of class is yours.

### Makeup assignment for missing class

If you cannot attend class, you must let the instructor know as soon as possible. The makeup assignment will consist of watching the lecture, and writing up a summary of what was covered, as well as your answers to the group discussion questions.

**Note:** This mechanism is intended to accommodate one-off absences or one-off schedule conflicts, and *not* to be a way to take this class entirely offline (see above; while committing your thoughts to writing is valuable, the learning comes from thinking them through with your peers).

# Assignments

There are only a small handful of assignments for this class. As mentioned above, the intention is to take as little of your time outside of class as possible.

## Self reflections

Think of this as a journal entry. Immediately after your class, jot down your thoughts about how things went. This is a space both to celebrate successes, and also to consider approaches to address issues. The TA for CS 375 (yes, the TA class also has a TA, it's very meta) will read your self reflections, and may leave comments on them to further discussion.

As mentioned above, content in self reflections will also make their way to class, especially if multiple people run into the same issues, so it is important to be thorough here!

## Peer observations

You will pair up with someone else in CS 375 and record each other's classes, as well as fill out an observation form for them. *This is not an evaluation*. Your goal here is to help your partner, and see what they do that you can incorporate into your own class. And as awkward as it is, watching a recording of yourself is the fastest way to improve your teaching.

This will happen twice throughout the semester, once near the beginning, and once near the end. The hope is that you can observe a noticeable difference between recordings.

## Survey

You will be giving the students in your class a mid-semester survey, and will follow up with them by discussing the feedback that they share. Going over survey results with your students will not only give you a degree of accountability and an avenue to provide further context, it will also improve your end-of-semester ratings. Cynically, your ratings will improve even if you don't do anything different; merely responding to feedback is enough (though, hopefully, you will actually make changes to address student concerns).

# Responsibilities as a TA

As a TA (or as we call it, a GSI), your responsibilities often include, but are not limited to:

- Teaching discussion and/or labs
- Managing readers and tutors
- Holding office hours
- Running homework parties
- Creating course content
- Proctoring exams
- Handling DSP accommodations
- Knowing and following privacy guidelines
- Answering questions on Piazza/Ed or email
- Recording video content
- Mentoring Academic Interns or Lab Assistants

Notably absent from this list is a mastery of the course material. This does not mean that you shouldn't spend time reviewing the material! After all, the better your understanding of the material is, the more likely you will be able to answer student questions. But at the end of the day, your job is not to successfully answer questions (you did that already when you took the class). Rather, your job is to make sure your students learn the material, and are equipped to do well in the course.

We will end by adding a few more responsibilities that people tend to forget about:

- Track your hours
- Take care of yourself!

It's an open secret that TAs are often overworked relative to their appointments. That said, the more concrete numbers we can gather and present, the more likely we are to solve this problem. More importantly, taking care of yourself is just as important as any of your other responsibilities. You are no good to anyone if you burn yourself out partway through the semester. Concretely speaking, you are needed at 100% for 15 weeks (or 8 in the summer), and being at 150% for six weeks and 0% for two weeks is much worse than being at 75% for eight weeks (despite giving a total of 300% more). Keep this in mind as the semester progresses. If your current workload is not sustainable, let your staff know: it is your employers responsibility to support you.

# First-day prep

## Tips for your first section

There are a multitude of things, ranging from big picture to minute details, you should be paying attention to while presenting or running class. However, for your first ever section, you should have exactly two priorities: getting through the material you want to present, and not passing out. If you can do both of those, your first section will be nothing short of a rousing success!

Here are some general tips to remember for your first section:

### Get Markers

Make sure you have at least two markers, preferably different colors. You should be able to get them from the front desk in Soda.

If you intend to use a tablet, make sure your stylus is working, and that your tablet is compatible with whatever projection method the room has.

### Familiarize yourself with the classroom

If possible, scout out the room before your first day. How do the boards and projector interact? Does the projector work? Do you have the appropriate cables?

In a remote setting, test out all of the settings for your space. Do your camera and mic work? Is your lighting sufficient? Is there anything distracting in your background? Do you have any windows or tabs open that aren't related to class?

Answering these questions before all your students are looking at you will do wonders for your stress levels.

### Be excited!

A simple truth is that **people have a hard time telling the difference between someone who is nervous and someone who is excited.** In both cases, you're talking a little fast and you have a lot of energy (and if you're like me, a little too sweaty). So if you find yourself nervous, do whatever you can to channel your nervousness into your excitement. Remind yourself of the things about teaching that excite you, and try your best to trick your brain into thinking all of your energy is about that excitement!

#### Smile :)

There are a number of psychological benefits of forcing yourself to smile (it sounds hokey, but it's true!), including calming yourself down and demonstrating being comfortable, but it is also the easiest way to channel your nerves into your excitement. If you seem really excited and happy, your students will get excited and happy, too!

## Breathe and speak slowly

This is something that people often forget to do while they are in front of a room full of people. Being conscious of your breathing goes a long way towards successfully navigating your presentation. Remember to take a full breath before every sentence. This not only helps calm you down so that you don't speak too fast, it also ensures that you don't run out of breath before you finish talking. Lastly, taking a long, slow breath gives you more time to plan out your next sentence.

Err on the side of speaking too slowly if you are unsure of your speed. Because you are talking about technical material, the slower pace will help people follow along (and if you're being recorded, people are probably listening to you at 2x speed anyway, so you can take your time).

## Prepare, prepare, prepare

While there is such a thing as spending too much time preparing the wrong things (for example, memorizing/writing down exactly what you're going to say in class), you can never spend too much time reviewing the material you're about to cover.

**Your confidence is directly correlated to your preparation.** The more solid you feel with the material, the more comfortable you will be at the board. A good rule of thumb is that you get 50% dumber when you reach the board, so you have to make sure you understand what you're presenting at least 50% better than you need to when you're by yourself (so you'll be at a comfortable 75% come presentation time. 75% is passable, right??).

**Solve the worksheet questions yourself without looking at the solution.** This not only helps with your understanding of the material, but your own struggles will also help illuminate the potential pitfalls students will run into. More importantly, it makes sure you **have a written form of every solution you want to present.** There is nothing wrong with having notes with you while in class!

At every step of the solution, ask yourself "why?" Dive deeper and deeper into the material until you are pretty confident you've answered every possible question that could be asked. It won't guarantee that you'll only be asked questions you've prepared for, but it greatly increases the odds!

## Pace yourself

Decide before class how far in the worksheet you want to get (or which problems you want to cover, if you want to go out of order). Remember that **if you get through the entire worksheet, it's either too short, or you're going too fast (or both)**.

Set checkpoints for yourself (eg "I want to be on problem 3 by 4:45PM"). This helps you see if you over/underestimate how long problems will take, as well as figure out when to say, "in the interest of time, let's move on".

**Do NOT rush to finish if running out of time.** It's much safer just to wait until the next class. When you try to cram in a solution quickly, it will end up confusing students, and you'll have to spend time next class un-confusing everyone anyway.

## NEVER ever, ever, EVER try to solve something on the fly at the board

Things like substituting different values into an equation are fine (though, even then, it's risky—arithmetic is hard). If you have a nightmare scenario in your head where you're at the board and you draw a complete blank while everyone is staring at you and all of a sudden you're exposed for the fraud[2] you are, this is the fastest way to get yourself into a situation where this might actually happen. If you draw a blank while presenting a problem you've prepared for, you at least will have something you wrote down earlier to fall back to. However, all bets are off when you go off script, so stay safe and:

When asked something you haven't prepared for, say "I don't know, but I'll find out and get back to you!" Either have the students work on a different problem while you work on it, or solve it offline and post to piazza or address it in the next class. Remember that if you don't know the answer to a question, it's a great question, and almost certainly a hard one.

## Parting words

Tell yourself this right before your first section if you have to**:**

You are here because you want to be here. You are here because your instructors want you here. You are qualified for this position.

You can do this.

[2] No, you're not a fraud. No, not even if you do mess up badly in your first section. Yes, I am talking to you specifically.

# Planning and running discussion

## Peer instruction

Peer instruction is a method of teaching that was popularized by Eric Mazur. Its basic assumption is that a student who has the correct approach to a problem (and therefore a stronger grasp of the material) is more likely to convince a peer who has the incorrect answer than the other way around.

### The flipped classroom

A corollary to peer instruction is the flipped classroom (or inverted classroom): by having students first work individually on a problem, then working with a problem, Professor Mazur had much greater success in class than through traditional lecture.

The inverted classroom has students read or watch the relevant material before class, then spend class itself working through problems together, with the instructor answering questions and providing guidance.

This model, while great in theory, suffers from one glaring issue: reliance on students to consume content before class itself. Without this key piece, the inverted classroom falls apart, as everyone does not have sufficient context to attempt the problems.

#### Berkeley's solution to the flipped classroom conundrum

UC Berkeley solved this problem by keeping traditional lectures in place as a forcing function for students to consume the upfront material required, and provide the space for learning in discussion.

Hopefully, this drives home how important it is to *avoid* turning your section into another lecture. Discussion is designed to be a flipped classroom, where your students can work together to bounce ideas off each other and practice solving problems in an environment with immediate support.

## Before section

### Finalize and solve the worksheet

The previous section takes having a worksheet for granted, but you should not! The worksheet for discussion should be finalized well in advance of the actual discussion section, and the solutions should have been proofread and tested. If you read that last sentence and wondered who should do that, fear not! There is an answer to that question, and the answer is you.

For each problem in the worksheet, try your best to solve it without looking at the solution beforehand. This not only reinforces your understanding of the material, it also helps verify the solution itself. Furthermore, it gives you a good sense of how difficult the problem will be for the students when it's their turn. The more time you spend doing this, the better! As a reminder, being confident in the material is the fastest way to calming your nerves while presenting.

Whatever you do, do **not** blindly copy existing solutions! Not only is there a chance the solution is incorrect, it may skip some steps that you will have a hard time reconciling on the fly. And if you are confused, your explanations will be confusing to your students.

Lastly, pick the problems from the worksheet you will actually cover in class. This should be a strict subset of the available problems; the rest should serve as practice problems. If you cover the entire worksheet in class, you either went too quickly, or the worksheet has too few problems (or both). This is not the first time this statement will occur, and it won't be the last.

## Erase the boards

The very first thing you want to do when you enter the room is make sure all of the boards are clean. It's not the end of the world if your students learn a new chemistry equation, but it can be quite misleading if they write down the Chem 1A TA's office hours instead of yours. Or worse, they'll see a giant "CHEM 1A" scrawled on the board, think they're in the wrong class, and miss discussion altogether!

## Talk to your students

Talking to your students before class starts serves two main purposes: it makes you seem more relatable to them (after all, students want to know that their TA is human), and it makes them seem more relatable to you (after all, you want to know your students are human). This is also a great way to get yourself warmed up before speaking in front of the entire class!

# Discussion cycle

Structure your discussion itself by doing one “loop” (outlined below) per problem you intend to cover. Repeat these steps until you run out of time.

## Review (mini-lecture)

Remind students about the concepts they will need to solve the problem. A mini-lecture where you talk for longer than 10 minutes isn’t helpful. Try to keep it to 5-7 minutes if you can, and try to limit the scope of the review to only the concepts required by the problem they are above to solve.

## Solve the problem (in groups)

Have the students work on the problem. It is strongly recommended to have them do so in groups. While they are working, try to get a sense of how people are doing. This will inform how long you should give them to work on the problem.

Periodically poll your students: "who is finished? who needs more time? who is completely lost?" If most of the students are finished, or if most of the students are completely lost, it's time to go over the problem together as a class. In the case where they are lost, sometimes a hint will be enough to make progress, but sometimes, the problem is just too complicated, and will require you to walk them through it. While your students won’t learn as much as if they attempted it on their own, they will still learn from watching you walk through the solution.

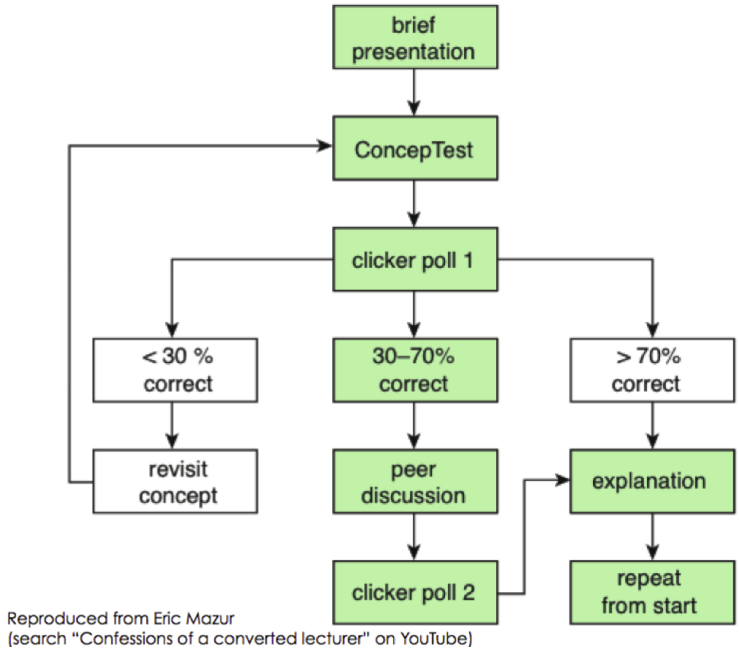
In the case where most of the students want more time, this is great! They are making progress. Try to have the students who are finished talk with the students who are completely lost (peer instruction!), and check in again with the class later.

## Present and walk through the solution

Go over the solution with the students. This can be done in a number of ways. You can have a student come up and present their solution up on the board, or you can present the solution yourself while getting input from the students.

If you have a student present their solution, make sure you look over their solution first. In fact, to save yourself from a potentially awkward situation, it's better to find a student's solution you like (by going around the class while they are working), then ask them to present it, rather than asking the class as a whole for a volunteer.

Another method that works particularly well is the "scribe" method: a student comes up to the board and writes, but they can only write what the class tells them to. Students can find telling their TA what to write a little intimidating, especially in the beginning of the semester. Having one of their peers at the board alleviates this stress. It also absolves the student who is at the board of any pressure: they are simply writing what the class is saying.




*A figure for how to do peer instruction. The ConcepTest can be group work instead of individual work, and clicker polls can be simple polls if your class is small enough.*

# Group work

Be proactive about promoting group discussion! It almost never just happens on its own. As a (former) CS student yourself, perhaps you can relate to your students' reluctance to form groups. That said, force your

students to be friends: being able to bounce ideas off their peers will go a long way towards making them successful in their classes.

In discussion, at the beginning, intentionally print fewer handouts than students. This devious scheme will force them to share, thus grouping them naturally. Students will catch on to this tactic and start bringing it up on their laptops, though, so you need to make sure they are comfortable working in groups before that happens!

In office hours and lab, aggressively bucket students who have similar needs. Group students together who need help with the same problem (be it homework, project, or lab). If you are running a lab where students bring their own machines, group them by OS: this will go a long way towards giving them easy access to OS-related debugging help.

Try to come up with a coherent argument for why students should work in groups. Explaining why they should do something will also make them more willing to do it. If you have trouble coming up with a good reason, brainstorm with your fellow TAs, as well as the instructor(s) for the course. There is likely a way to restructure class such that group work makes sense.

# Pacing

## Set checkpoints

Create a series of mental checkpoints (write them down if you have to!) for yourself for each discussion: you should have a rough idea of how long each problem should take, and thus how many problems you intend to cover in class. For example, during your preparation, you might tell yourself, “class starts at 3:10pm, and I want to be on problem 2 by 3:35pm”.

## Cater to the middle third

Ultimately, because you have to address the class as a whole during discussion or lab, you need to set your pacing such that it is just right for the middle third of students. Ideally, you want a third of your students to think the pacing is too fast, a third to think it's too slow, and the last third to think the pacing is just right. The other two thirds can be addressed in your office hours: the open-ended nature helps address both those who are falling behind, and also those who are far ahead.

## Explain worksheet pacing to students

Students will sometimes complain about pacing because they expect to finish the whole worksheet. By explaining to them that the worksheet is not meant to be finished in class, you make students happier by setting expectations and you take pressure off yourself to feel like you have to finish the worksheet!

## Easy vs difficult problems

Another non-trivial task to consider while preparing for discussion is what order to cover the worksheet problems, and which problems to cover. Ideally, the worksheet will be written in a way where going in order makes the most sense, but that won't always be the case.

Start things off with a softball problem. This will serve as a warm up for the students, both as a confidence booster, and also a way to get them ready to talk and think. If this problem is so easy that you can cover it with the class at the board without breaking everyone into groups, that's perfectly acceptable.

After that, try to cover the harder problems first. This way, students will spend majority of discussion working on difficult problems, thus maximizing their time in an environment where they have a lot of support. And, if you run out of time, at least you will have covered the hard stuff already!

In any case, make sure to give a quick review, however brief, before diving into any problem!

### Feel free to skip things

If you miss your self-imposed time checkpoints and fall behind, feel free to skip things until you no longer feel the time pressure. Remember that **it's better to skip something and cover it next time than to rush through it at the end of class.** When you rush at the end, you will inevitably skip steps, which will confuse your students. This in turn means you'll have to explain things again next time, resulting in more total time being spent.

In that vein, if students are really engaged on a particular problem, it's ok to spend more time on it. Covering a complicated problem in depth can be more beneficial than superficially covering a bunch of problems.

## After section

If you need to go after class is over, do not feel obligated to stay! Taking care of yourself is just as important as answering students' questions. That being said, if you don't have anywhere to be, and are feeling particularly helpful at the moment, this is a great time to field any questions you couldn't get to during class.

This is also a great time to pause and reflect on your class while it's still fresh in your mind: what went well? What would you have changed? Were there any things you'd want to clarify? Sometimes just a few small tweaks will make a world of difference!

## When things don’t go as planned

When things don't go perfectly, remember to breathe! Staying calm is the single most important thing when things start feeling like they are slipping from your control. You can buy yourself some time by having the students start on another problem while you collect your thoughts.

A little secret: if you do nothing, things will likely work out for most students. By definition, most of your students will be average, with some above, and others below. Of course, your job as a teacher is to try to do better than that. But as a reminder, much of your students’ learning happens outside of the classroom. While you should be there to help them when they are stuck and support them throughout the course, don't put an unreasonable burden on yourself to do everything for your students—it'll only burn you out.

## Mistakes

Disavow yourself of the notion that you have to be perfect. This is your first time teaching, and you need to remind yourself of this and hold yourself to a reasonable standard. You *will* make mistakes, so it is less a matter of preventing them, and more about how to recover from them.

If you tell students something wrong, make sure you tell them it's wrong! The only thing worse than making a mistake is having it propagate. Most of the time, you'll be able to recover quickly and correct yourself. If you find yourself totally confused, that's ok, too! Take things offline by having the students work on a different problem so you have some time to work on it, or wait until class is over and post the clarification to Piazza. As awkward and uncomfortable as it may be, make sure that everyone is on the same page in terms of what was wrong, and what the correction should be. And remember, even though it's embarrassing, students like knowing that their TAs are human. Embrace the relatability!

Another way to turn a mistake into a learning opportunity is to explain to your students why you made the mistake, rather than immediately moving on from it. Addressing misconceptions head on is a great way to help students learn the material!

## Running out of time

It's ok if you don't finish the worksheet! As previously mentioned, if you finish the worksheet, that either means that you went too fast, or there weren't enough problems.

If you're unhappy with how much material you covered, ask yourself the following questions:

- If you could cover one more problem, which one would you have covered?
- For each problem you covered, how much time did each one take?
- If you had to skip one of the problems you covered in order to cover the one you couldn't, would you? If so, which one would you skip?

Having a variety of problems in the worksheet is a good thing: you want to have both easy and difficult problems the students can practice on their own time. Try to triage the problems for the next worksheet: which ones are essential to cover, which ones would be nice to cover if there's time, and which ones are best left as exercises? Correctly triaging problems comes with practice, but the sooner you start, the sooner you'll get better at it!

Another way to get a sense of your pacing is to ask other staff members how much of the worksheet they got through. Also be sure to ask how much time they spent on each question, and how they structured the time (presenting vs group time, etc).

# Planning and running lab

Many of the principles for running a discussion are also relevant for running a lab. In many cases, the only real difference will be that students will be working with code on their computers.

## Pair programming

Pair programming is a great way to promote group work. Specifically, the driver/observer nature allows students of different experience levels to effectively work together. As a reminder, pair programming is a structured exercise: it is *not* simply putting two students together and telling them to pair program. Students should also regularly switch roles, so they are not always typing or always dictating. For quick reference:

- Do:
  - Reach a consensus before moving on from any line
  - Have the observer suggest what to type before the driver types anything
  - Pair with differing experience levels
- Don't:
  - Let the driver solve the entire problem with no input from the observer
  - Stay in the same role the entire time

## Debug students, not their code

It is especially important in lab to make sure you do not debug your students' code for them. Not only is this an inefficient use of your time, you are depriving your students the learning opportunity to develop debugging instincts of their own!

### Ask open-ended questions to encourage discussion

For more involved problems, break the question down. For example, for a question that requires students to come up with a quicker algorithm using a data structure, you could first ask, "what are some data structures you've thought of using, and why?". You could then go on and ask if there are particular requirements that might lead one to choose one data structure over the other.

Easing students into talking about difficult questions like this will 1) help students learn how to get a start on hard questions 2) give you an opportunity to collaborate on more difficult questions with your whole class 3) not make difficult questions seem so out of reach.

## Pacing

Similarly to discussion, set checkpoints for yourself for where you expect students to be in the lab assignment by what time. If need be, you can do a global "catch up" at each checkpoint, where you walk through the lab up to the point you've designated (those who are farther ahead are free to ignore), to ensure that all students are able to get through all of the lab material.

# Playing music

Music can help your lab to have a more casual vibe (collaborative spotify playlists are awesome), but there might be students who feel strongly against not having music. Ask your students about it in an intro survey or poll, and be mindful of the kind of workspace you want to encourage.

# Individual check-ins

Lab can be a good place to check in individually with students (this is especially true for CS 61BL). If your course has weekly surveys, try to read the responses of usual lab attendees before class so that you can check in on any students that are currently struggling. To respect their privacy, ask them if they want to discuss what they mentioned in their survey instead of bringing up exactly what they wrote.

# Presentation

## Presentation style

When it comes to giving an engaging presentation, it is most important to present in a style that feels natural and authentic to you. Otherwise, your audience will be able to tell that you are trying to force things. For example, if you are naturally a serious person, you do not need to crack jokes throughout class. Conversely, if you are a more casual person, do not feel the need to show up in a suit (literally or metaphorically).
You may have several presenters (other instructors, professors, content creators, etc) whom you admire and want to emulate. This is, in and of itself, a good thing. However, be mindful of their styles. Some styles will come more naturally to you than others. Try to find a variety of presentation styles, and tailor your own presentations to align with what makes you comfortable.

## Make sure everyone can hear you

Every now and then, especially early in the semester, check to make sure everyone can hear you. This is particularly important for the people who sit in the back of the classroom. Be sure to get confirmation (verbal, thumbs up, etc) before moving on. If people can’t hear you, the easiest way to remedy this is to ask everyone to move closer to the front of the room. If this is not possible, another quick way to help people hear you better is to speak slightly slower.

## Plan your board work

Much like slides, board work requires planning. Make sure your writing has a flow: don’t "wall of text" your students, and definitely don't come in early and pre-fill the boards with text (you may as well use slides at that point)! After you write a particularly important formula, definition, or key phrase, take a moment to let it sink in (and let people copy it down). Don't jump immediately to the next thing.

If you are in a room with multiple boards, don’t feel restricted to a single board per problem. If you run out of space, rather than try to cram the rest onto the board you're using, simply overflow to another board.

That said, before you start writing on a board, erase everything on it first (make sure to check with your students before erasing it to make sure anyone who is transcribing the board has a chance to finish doing so). This is similar to erasing the boards before class starts: you want the only topic on that board to be the one you're currently talking about. Don't let diagrams or text from the previous problem distract your students while you're talking about the current one.

Lastly, stay aware of the "back of the room" line. This is the line under which people in the back of the room cannot see. Not writing in this area not only makes sure everyone can see everything, it saves you from having to stoop down awkwardly to write there! The easiest way to figure this out is to ask the back of the room whether they can see below a certain point (binary search can be helpful here). The same applies to the left/right edges if your room is particularly wide. Make sure you physically mark these edges!

# Don’t talk into the board

Though it will be very tempting to do so, do not talk to the board. If you find yourself speaking while not facing the classroom, turn around! You might be surprised to see that everyone has left because they thought you weren't talking to them. Ok, that probably won't happen, but more realistically, you will turn around to see a student with a question who has been patiently waiting the entire time your back was turned.

# Don’t talk and write at the same time

This is the number one culprit for making you talk into the board. It feels incredibly awkward to write something on the board while the entire room is silent, but rest assured, your students are plenty occupied reading what you are writing.

# Powerpoint slides: pros and cons

Slides can be very helpful while running discussion, but there are a lot of ways to make a distracting powerpoint presentation. Make sure they don't have too many words, and though it's time consuming, use animations so that students don't just get hit with walls of text!

Alternatively, dense slides can serve as reference material to be consumed separately from section. Students like to have material they can review on their own time, and you can use them to help with your own preparation and presentation.

Professor Shewchuk has a wonderful post about how to give a good talk. Try to incorporate as many of those ideas into your slides as possible.

One other quick tip: if you plan on using the projector for only part of your class, only have it on when you need to use it. Few things are more distracting than a random desktop, or worse, a pre-loaded video that the TA just refuses to address!

# Coding Demos

Coding demos can be a great way to supplement a presentation. However, in order for a coding demo to run smoothly, it will require more preparation than a standard presentation with only boardwork. Make sure to perform at least one dry run before class, and make sure the projector not only works, but has the right cables for your machine!

# Interacting with students

## Keep things professional

Remember that while the course is happening, you need to maintain a professional relationship with all your students. This can be especially hard if you are the same age (or in some cases, roommates!) as your students. But like it or not, you hold power over your students: while you don't control the final grades they get, you still have a significant influence on them. Having a personal relationship with them can be seen as a conflict of interest.

Furthermore, spending more time with certain students than others can be construed as favoritism. By keeping things professional, you protect yourself from possible problems down the road. Avoid things like adding students on social media or accepting gifts that can't be shared with the rest of the class. And this probably goes without saying, but is still worth explicitly noting: **do not date your students.**

Lastly, you cannot get paid to tutor your students outside of class. This also creates a conflict of interest: you would be getting paid to help a student do well (as their tutor), while also being in control of their grades (as their instructor).

If you're ever confused about whether something is appropriate, it's probably a sign that you shouldn't do it. Err on the side of caution and stay professional.

All of that said, you do not have to cut off all non-class interactions with your students entirely. Just as a rule of thumb, keep things inclusive, use your best judgment, and just like the course material itself, ask if you are unsure about something!

## Defer to a professional as necessary

An important reminder: **your job description does not include maintaining students' mental health.** Just like it's important to remind your students that they are not alone, it's important to remind yourself of the same! There are trained professionals available for the tougher things that require it. It is ok to listen to students when they come to you with personal issues, but you feel like either you are your student is in over their head, you should point them to someone who is professionally trained to handle the situation. In the case of mental health, you can point them to Tang or the ESS psychologist: https://uhs.berkeley.edu/counseling. Do your best to connect them with whoever is necessary, and get help from your staff as necessary.

For things like harassment, discrimination, or other HR violations, remember that you are obligated to report any incidents.

## Elicit questions, not statements

We are very conditioned to call-and-response. Specifically, when someone asks a question, we are conditioned to answer with a statement. This is why “does anyone have any questions?” is an ineffective way to ask your class for questions: they are conditioned to respond with a statement, most often, “no” (well, more realistically,

silence), rather than any questions they may have. Similarly, “does this make sense?” will most often be met with a response that is hard to follow up on. Instead, try some of these statements to encourage a response that is a question:

- “Someone ask me a question.”
- “I just threw a lot at you. Tell me which part I should explain again.”
- "Someone tell me which part didn't make sense; it's ok to say none of it did!"
- “This part is very complicated; I’m ready for your questions!”

If you do ask your class a question, ask questions where their answer leads to something actionable. In the example above, rather than ask “does this make sense?”, you can ask, “should I cover this part again?”, or “should we cover a harder problem next, or an easier one?”

# Address common misconceptions

Khan Academy and the Effectiveness of Science Videos

One approach you can try with your class is to present incorrect solutions that are caused by some misconception (a great source of this is to take note of your own failed attempts to solve the problems you’re presenting), and ask your class, “why doesn’t this work?”

This will immediately boost engagement, as the reason why it doesn’t work may not immediately be clear. Better yet, some students may have tried that exact approach, so they will be extra curious as to why they can’t do it that way.

Keep in mind that this is less about “this is a wrong approach, let’s make it correct”, and more about “this is *your* approach, let’s shore up the gaps”. Note that you will want to avoid telling students “this is your wrong approach”! This is why it’s important to present the incorrect approach as your own.

At the end of the day, you are trying to lead students from their current point of understanding to the correct point of understanding. The more you can make this a stepwise process, the more likely the student is to retain the information. The last thing you want is for them to “teleport” to the correct answer, where they just memorize what you say without really understanding it, in the hopes that they can repeat it later for credit.

Lastly, when presenting incorrect solutions, make sure you tell your class upfront that it is incorrect. Student attention is notorious for waxing and waning, and you don’t want someone to tune in part-way through your presentation and absentmindedly jot it down, only to be burned by it later.

# Answering questions

Fight the urge to answer your students' questions immediately, or to start trying to work out the answer yourself. This is especially tempting when you don't know the answer immediately. Remember, it’s not about proving that *you* know the answer, it’s about getting your students to discover it.

## Don’t interrupt

Most of the time, you will know what a student is trying to say before they finish their thought. **Resist the urge to save time by finishing their thoughts.** Even if the student says something completely wrong, let them

finish their sentence. Starting with an incorrect solution and arriving at a correct one is a very powerful and effective teaching moment! You also will be surprised how often a student ends up saying or asking something very different from what you originally anticipated.

## Phrasing matters

In the vein of letting students feel comfortable in class, your phrasing really matters! Avoid phrases like "this should be obvious" or "this is clearly true" (~~hopefully the reason for this is obvious~~ after all, if it is indeed so obvious, explaining why should take you no time at all!). Such phrasing can discourage students from asking questions. Subtle changes here can make a world of difference. For example:

- Avoid: "you should have learned this"
    - Try: “you might remember this from [lecture, previous lab, etc]”
- Avoid: “[obviously/trivially/clearly], X”
    - Try: “X”
- Avoid: “you should drop this class”
    - Try: “this class moves fast, and has the following prerequisites: X; we should come up with a plan for you to stay caught up” (often times, this process is enough for the student to make the decision on their own)
- Avoid: “no, that’s wrong”
    - Try: (as appropriate)
        - “Almost”
        - “You’re on the right track”
        - “That’s the right idea”
        - “Not quite”

## Try to have students do most of the talking

Oftentimes, students will tell you about their confusion and then eventually figure out the answer to their own question. Encourage your students to use you as a "rubber duck", as this will help them think through their thought process independently.

## Show, don’t tell

Try your best to guide your students to the answer, rather than outright saying it. Focus on helping them develop a robust and logical thought process, rather than giving them the answer. The socratic method is a great way to do this: try your best to answer their questions with a question. Ask students what they know before answering their original question. This helps you understand how well they understand the concepts, and where they might have a misunderstanding.

## Debug your student, not their code

If you think of your student as a program, their inputs are the underlying concepts, and their output is their code. But something went wrong, and their output is buggy. As an instructor, rather than debug the output, you want to debug the *program* that generated the output. In this case, that is the student’s understanding of the material!

By asking the student questions, that is the equivalent of your print statements. If you ask, “in what order do elements leave a stack?”, and the student responds, “the order in which they were added”, you know right away where the “bug” in their understanding is: they have confused a stack with a queue.

## Example: depth-first search

Consider the following scenario: your student is trying to implement depth-first search, and asks you for help. They show you the following (buggy) implementation. As an exercise, time yourself and see how long it takes you to find the error:

```
1  def depth_first_search(root, goal):
2      stack = [root]
3      while stack:
4          node = stack[-1]
5
6          if node.value == goal:
7              return node
8
9          for child in node.children:
10             stack.append(child)
11     return None
```

First, observe the following fact: the whole time you are reading their code, furiously trying to figure out what the problem is, *your student is sitting in silence staring at you staring at their code.* To finish the exercise, try sitting in silence while staring at the wall for 20 seconds; this is an excruciatingly long time! For reference, in a classroom full of TAs, it takes roughly 20 seconds for half of them to find the error, so it’s not a stretch to say that your student may be sitting there for even longer. This is an inefficient use of both your time, and your student’s time!

### Ask questions, and let the student do as much of the talking as possible

So rather than dive into their code immediately, start with the question: “before we jump into the code, can you give me a high-level overview of your approach?”

This will quickly give you an idea of where the student’s current understanding lies. Specifically, how they answer this question lets you know whether you should spend your time at the conceptual level, or at the implementation level.

Next, ask them to walk you through their code, but importantly, *line by line*. It is easy for them to gloss over sections of the code, which in turn makes it much harder for them to pinpoint any issues. When they get to line

4, they might immediately spot the error, correct it, and happily be on their way. If this happens, no real followup from you is necessary. But if they don't catch it, and instead say one of the following:

- "and then we pop from the stack"
- "and then we grab the last element in the stack"

These two descriptions of line 4, while similar, immediately lets you know whether they they didn't translate what they wanted to do into code correctly (the first answer), or if they misunderstood how the stack data structure works (in this particular case, that grabbing the last element of a list doesn't remove the item). Not only will this help your student find the error, it will also help you find out *why* they made the error.

### Important note about debugging students

Note that in this example, *you don't need to know what the error is upfront!* This is very important to remember: you do not need to know what the problem is to start helping a student debug their code. After all, you are debugging their understanding, not their code!

## Take time as necessary

Don't be afraid to actually work out a problem yourself and get back to folks. Giving your students a stream-of-consciousness answer is a good way to confuse them. You will likely have to re-explain things anyway, since that first try will be unrefined. Having students work on a different problem on the worksheet or lab can buy you the time you need to gather your thoughts.

## Use the whiteboard whenever possible

This is a good habit to develop. It's far preferable to write some things down or draw some diagrams that you ultimately don't need than to spend several minutes on a question and either lose your train of thought or have your students forget what was said and have no notes to fall back on.

Using the whiteboard also forces you to write out your steps. This helps ensure your flow is logical and correct, and helps you slow down.

This is also a good habit to encourage in your students. When they have questions, encourage them to use the board to draw out their thought process so that you can follow along as well.

## No hand-waving your answers

If students ask you a question that is out of scope or would take a long time to answer in depth, feel free to defer those questions until after class ends. Remember that you're teaching to the middle third! Discussion is the room's collective time, not just one student's.

However, if a student asks you a question that doesn't fall into the aforementioned categories, then make sure to answer their "why" and "how" questions! Your role as a TA is bigger than just giving them the answer and helping it to make a little more sense. Students can get answers from the solutions, but the solutions usually can't answer their deeper questions about the material.

This doesn't mean that you need to have all the answers. It might be intimidating to be asked about the nuances of a concept, especially if you're a new TA. Tell the student that you'll get back to them later, or that

you'll post on Piazza later that day (and make sure to do it!). You can also tell that student to email you a reminder to do so. Students usually understand, and you're able to think a bit more about their questions.

# Student participation

While honing your presentation skills and creating positive interactions with your students is important, it is just as important, if not more so, to create a welcoming classroom climate that is conducive to learning. If students do not feel like they belong in the classroom, or otherwise feel stressed while in class, they will not be able to learn. That is, creating an inclusive classroom *is* creating a classroom where students can learn.

## Watch for assumptions

People come from all kinds of different backgrounds and experience levels. Not everyone will recognize pop culture references. Not everyone learned English as their first language. Not everyone will find the same things easy or difficult. Not everyone has been coding since they could read (conversely, not everyone has been told they should not be coding at all since they could read). Put another way, not everyone is you.

Furthermore, students do not need to become you. What works (or doesn't work) for you may not be the case for them. The better you can understand your students, the easier you will be able to teach them. Finding examples they can relate to will be more effective, while examples they can't relate to will only confuse them further. As you build rapport with your students, learn what works for them, and challenge yourself to figure out the most efficient way to tailor your explanations from a perspective they will understand.

In that vein, having students work in groups is all the more important: by being exposed to different perspectives and approaches, not only will they gain a better understanding of the concepts, you will learn more as well!

## Remove stereotype threat

Stereotype Threat: A Conversation with Claude Steele

Stereotype threat happens when someone is reminded of a stereotype associated with a certain aspect of their identity (their race, ethnicity, gender, or nationality, to name a few), and creates an outsized effect[3] on their performance. Stereotype threat can make a person feel reduced to that single aspect of their identity, and that everyone who shares that aspect acts as a monolithic entity. Thus, they can feel like they must represent an entire population of people, rather than just themselves.

Amazingly, a student does not need to believe the stereotype to be affected by it; merely being reminded of it is enough (and yes, walking into a classroom or office hour and being the only person who looks like you can be an immediate reminder). But just as amazingly, as Claude Steele mentions, by tackling stereotype threat head on (and doing what you can to create "identity safety"), you as an instructor can mitigate its effects.

If you want to collect any identifying information about your students, do so outside the context of assignments (in other words, do not be like the SAT and ask for it right before the exam). Make your intentions clear for why you are gathering said info (for example, to enable people with similar experiences to connect with each other).

[3] This effect is almost always negative. There have been a few experiments to create positive stereotype threat, but have had inconsistent results

Lastly, remember that what you say, and how you say it, matters. For example, telling someone, even jokingly, that they can always get someone to do their homework for them, can be enough for them to drop the class, or the major, altogether. While that comment by itself is not damning, if this person has constantly had to deal with such casual implications that they can't do anything themselves, this can be the straw that breaks the camel's back. What feels like an offhand comment or a throwaway joke can end your student's CS career. Do not be that person.

# Normalize pronouns

Let's explain pronouns with a CS analogy. We traditionally think of a person as follows:

```
class Person {
    private String name;
    private boolean isMale;

    private Map<String, Boolean> knownPeople;

    public String introduceSelf() {
        return name;
    }

    public void meetForFirstTime(Person newPerson) {
        knownPeople.put(newPerson.introduceSelf(), computeGender(newPerson));
    }

    /**
     * Based on a set of features of the new person (hair length, body shape,
     * clothing, voice, etc), predicts whether the person is male.
     */
    private boolean computeGender(Person newPerson) {
        // implementation goes here
    }
}
```

While `computeGender` can yield a very high accuracy, it is almost impossible to get 100%, and it is rather resource-intensive. We can solve this problem by using the ground truth that already exists: have the sender broadcast the relevant information, rather than force the asker to waste compute. Lastly, a person's pronouns do not necessarily reflect their sex, or even their gender. Using a boolean for a person's sex (and by proxy, everything else) requires an implicit understanding of what a true and false value means, and subsequent unnecessary translating. We instead will use an Enum for a person's sex. This has the added benefit of making it explicit that a person's sex is no longer used in common interactions. Backwards compatibility will be an issue, but we expect that the tradeoff will be worth it in the long run. Note that while we could also simply make all the fields public, this has privacy and security concerns, and is not good practice.

```
class Introduction {
    String name;
    List<String> pronouns;

    public Introduction(String name, List<String> pronouns) {
        this.name = name;
        this.pronouns = new ArrayList<>(pronouns);
    }
}

enum Sex {
    // biologically-classified sexes to be listed here
}

class Person {
    private String name;
    private Sex sex;
    private List<String> pronouns;

    private Map<String, List<String>> knownPeople;

    public Introduction introduceSelf() {
        return new Introduction(name, pronouns);
    }

    public void meetForFirstTime(Person newPerson) {
        Introduction intro = newPerson.introduceSelf();
        knownPeople.put(intro.name, intro.pronouns);
    }
}
```

A person's pronouns, just like their name, refer to what you should call them. When you first learned about pronouns, using "he" or "she" to refer to someone took some adjustment (though, if you're a native english speaker, you likely do not remember this because you were likely a small child). Similarly, asking for someone's pronouns rather than assuming them will take some adjustment.

Lastly, be mindful of the distinction between asking someone what they would like to be called and what they are. To avoid making this mistake in your classroom, you must first internalize this distinction. When asking students for their names and pronouns, you are not categorizing them into genders; instead, you are simply asking them what to call them. For example, consider the following introductions:

- "Hi, my name is Esther. I use she/her pronouns. What's your name?"
- "Hi, my name is Christopher. I am white. What are you?"

It's a subtle difference, but what makes the latter so uncomfortable is that it asks the recipient to categorize themselves, rather than simply give their appellation.

Normalizing pronouns in your classroom is as simple as using the new API. When you introduce yourself, include your pronouns. When asking for a student's name, also ask for their pronouns. The more you practice this process, the more natural it will feel to you, and subsequently, the more comfortable your students will feel sharing their pronouns.

### Third-person singular "they"

Another thing you will want to practice is using "they" to refer to a singular student, either when you do not know their pronouns, or when you want to talk about them without revealing their name. For example, in a staff meeting, you might say, "One of my students had a question I couldn't answer today. Here's what they asked: …". Not only is this faster than "he or she", it is more inclusive (literally, since the set of all pronouns is not included in "he or she").

And if it matters to you (or if you find yourself in a discussion with the ~~pedantically~~ grammatically inclined), using "they" to refer to a single person dates back as far as the King James version of the Bible. It is grammatically correct to use "they" as a third-person singular pronoun.

## Commiserate with your students

When you have a hard time understanding something, it never feels good for someone to tell you how easy it was for them, or for them to tell you that you shouldn't find it so hard. Students can feel like they're alone, and Berkeley has a culture of not openly talking about struggles. One way you can encourage a better environment in your class is to talk freely about your own struggles in the course. Students will feel better knowing that their TA also found things difficult, but eventually learned it well enough to teach it!

This can also apply to the day-to-day. If you're having a particularly rough day (maybe you didn't get enough sleep, you're coming down with a cold, or you have some deadlines that are causing you stress), feel free to share this with your students! It's important to normalize not always having to be 100%.

## Encourage student participation

### Get them used to talking

Students talking isn't just about finding the right answer—it's also about getting them to talk to each other, and hearing how they feel about the problem at hand. Lob a few softballs at them to start, just to get them in the habit of participating in class.

Softballs are questions with straightforward answers: providing a definition or formula, performing a computation, or otherwise something that you expect most of your students to be able to easily answer (think of questions that someone with grep could likely answer).

That said, avoid saying things like, "this problem is super easy, everyone will get it". If you need to say something about a problem, you can say that it's meant to make sure everyone is on the same page. There's no need to make a judgment call on how many people "should be able" to get it.

## Wait for students to answer questions

After you ask a question, try waiting for a few seconds longer than what feels comfortable. You might think you're waiting too long, but while you have already worked out the answer ahead of time, students are processing this information for the first time, and are also trying to build the courage to speak up. Furthermore, awkward silences can actually help encourage students to answer by dialing up the discomfort in the room (someone will speak up if it gets too unbearable)!

## Avoid cold calling on students

Even if you're trying to get everyone to participate, cold calling can make students feel like they’re being singled out. Instead, offer incentives for answering/asking questions (e.g. participation from all gets everyone food), or use a random number generator to pick people (e.g. the random number you pull is the student with that numbered spot on the roster). Being transparent about how students are expected to respond goes a long way towards making them comfortable!

## Engage students (particularly shy students)

Just because a student doesn't ask questions doesn't mean that they don't have them. Keep in mind that engaging shy students doesn't necessarily mean calling on them to answer a question. You can find them individually while the class is doing partner/group work, or otherwise make sure they are getting the support they need.

Sometimes, a shy student is perfectly comfortable not participating, and is still able to follow along. This is perfectly acceptable! However, if they are struggling with the material, suggest different ways in which they can get support, be it introducing them to their classmates, coming to your office hours, or talking to any other staff that is present in class (AIs, lab assistants, etc).

If students are asking questions privately that the entire class can benefit from, encourage them to ask some of their questions in class instead. For example, you can say, “this is a great question that I want to cover with everyone. Feel free to ask these kinds of questions in class next time!”

## Look over a student’s solution before having them present it

Students may not offer their answer in class because they're not sure if it's right, and they don't want to be wrong in front of everyone. If you want certain students to present, you can ask to check out their solution and then encourage them to share it if it's on the right track. Encourage students to come up and write their solution on the board, or use the scribe method.

## Wrong answers from students

### In class

When called on, if a student gives an incorrect answer or if it's completely off-base, acknowledge it as such, then move on (e.g. "hmm, not quite"). Otherwise, try to get the class to get from the original answer to the correct one. Make sure to do this in a way that does not single out the student who gave the answer. The easiest way to do this is to take ownership of their solution yourself. Concretely, this means avoiding calling the

solution “their solution” (instead, “the solution” or “our solution”), and talking to the class as a whole, rather than to the original answerer. Normalize the fact that it's okay to not know, and show students how valuable of a learning experience it can be.

### In a one-on-one setting

If a student's answer is completely off-base, listen to what they have to say, but also try to rein them in early. Point them to the appropriate materials (lecture notes, reader, past discussions/homework) to refresh their understanding. If they've already looked at these materials or are unconfident in going through it themselves, try to isolate their misunderstanding, and give them a relevant hint. Give the student some time mull over the new information, then circle back to them later.

## Get students to answer other students’ questions

This can work, but be careful! One problem is that sometimes students can answer other students' questions in a condescending manner. If a student answers in a poor manner, rephrase their answer in a way that does not talk down to the asker, and make sure to address the entire class so that no one feels singled out. After class, talk to the answerer about it afterwards (most students are not even aware they come off that way).

The best kinds of questions to open to the class are questions that can generate discussion. For this reason, you should answer yes/no questions or definitional questions yourself.

# Solicit feedback

## Make it easy to give feedback

It's usually not enough just to say, "hey, feel free to give me feedback!", since most students won't come up to you and tell you how they feel. An effective way to get feedback is to have a persistent feedback form that students can fill out at any time. If you need more specific feedback, you can create a short google form with more targeted questions. It's helpful to have a numerical scale of 1-5 to help students quickly communicate how they like the format, and then have a space where they can explain why they chose that number.

## Avoid questions that are too specific

Don’t solve problems in your classroom that don’t exist. For example, while asking if students can hear you is a good idea, you will want to avoid asking students if you moving your hands a lot is annoying. This doesn’t add to any discussion, and in fact may draw people’s attention to it when it wasn’t otherwise an issue. Though, if it comes up independently from student comments, it might warrant more attention.

Instead, ask students about things like the format of your class (the balance between lecture and group work, pacing, difficulty of problems covered, the thoroughness of the worksheets and solutions, etc), and ask them for suggestions.

## Directly address feedback

After you have read student feedback, summarize the key points, and present your findings to your class. Explain the changes you plan to make as a result, or explain any changes you won't make (for example, if everyone in class asks you to bring them food, you can explain why that is not a feasible change).

The most important part when addressing feedback is making students feel heard. Even if you do not plan on changing things, explaining why things are the way they are, even if they don't agree, will improve the overall classroom environment. And cynically, addressing student feedback (even if you don't make any changes) will improve your ratings come evaluation time at the end of the semester. Don't underestimate the value of sharing your students' feedback with them!

# Understanding students

## Growth mindset

Carol Dweck coined this phrase, and it is one of the most important mindset shifts required for effective learning. Specifically, having a growth mindset establishes the expectation of struggle: dealing with difficult concepts necessarily requires you to be bad at it (at least to start). And while it doesn't claim that everyone has equal ability, having a growth mindset means that every student should believe they can improve with dedicated effort and time.

That said, an all-too-familiar failure mode of the growth mindset is when a student tries everything they possibly can, and still struggles with the material. Oftentimes, this comes down to a student lacking some fundamental knowledge or expertise (a "broken futon effect"). By successively asking a student more basic questions, you can drill down to which fundamentals they are lacking, and direct them to shore those up as their time and willingness allows.

## Imposter Syndrome

**Imposter syndrome**: a psychological pattern in which an individual doubts their accomplishments and has a persistent internalized fear of being exposed as a "fraud".

Imposter syndrome is one of the hardest things you will have to deal with when it comes to your students. It is often more of an emotional reaction than a logical one. Both students who are struggling and excelling can experience imposter syndrome, so it is not sufficient to simply assure someone that their performance is satisfactory (or better). It is also annoyingly self-perpetuating, and if left unchecked, this self-doubt will consume the student's entire mental bandwidth. Rather than spending their time on practice problems or reviewing the material, they will instead spend all their time thinking about why they aren't good enough, or wondering how long it will take for them to get kicked out.

Here is the single best piece of advice I can give to anyone experiencing imposter syndrome (to tell your students, or yourself): how you got here does not matter. What matters is what you do now that you are here. Now is your chance to make the most of this opportunity and show everyone (including yourself) that you do belong. Know that you are not alone in feeling this way: it is hard to speak up, but if you do, others will follow suit. And lastly, remember that any time you spend worrying about being exposed could instead be spent reviewing the material or asking for help.

It's ok not to know things! What's far more important is knowing how or where to learn things. You may have heard the phrase, "fake it till you make it". This is a dangerous phrase, as it can be very isolating. Not letting anyone know you are stuck is the surest way to remain stuck. To that end, fake confidence, not knowledge. If you constantly tell yourself you will be able to figure something out, instead of isolating you, it creates a positive feedback loop. You may not believe yourself at first, but the more times you figure things out, the more it will build your confidence that you can!

As an instructor, it is important to remember a subtle, yet important distinction: imposter syndrome is something one *experiences*, not something one has. The more individualistic and zero-sum your classroom

feels, the more likely your students will experience imposter syndrome. The most common refrain is that a particular student feels like they are the only one who is struggling. You can combat this by frequently highlighting your own struggles, as well as regularly grouping students together who have the same questions.

# Expert Blindness

Imagine a scenario where you have to explain to someone how to make a U-turn in an intersection. You might tell them they need to make sure to turn the steering wheel all the way to the left to minimize the car's turning radius, or that they need a wider path than if they were just making a left turn. However, you might forget to mention that they need to release the brake and (slowly!) press the gas pedal in order for the car to move. You also might forget to tell them that even though they will need to wait longer before turning, they should not put the car in Park or activate the parking brake.

Oh, and this person is still trying to get their driver's license.

It can be easy to forget that the person you're explaining a concept to is likely seeing it for the first time. They have yet to tackle the homework, lab, project, or midterm and really spend time with the material. Things that may seem obvious to you could very well be the thing that's confusing your students the most.

Case in point, we have yet to actually define Expert Blindness, despite having talked about it for three paragraphs (because we took it for granted... oops!). So, to practice what we preach:

**Expert Blindness** (or the Expert Blind Spot): the tendency to forget or underestimate the initial difficulty of learning a concept due to having a deep understanding of said concept.

# Additive and multiplicative knowledge

Broadly speaking, knowledge can be categorized in two categories: additive and multiplicative. Additive knowledge assumes no prior understanding, and because of this, is more or less interchangeable with other forms of additive knowledge. Multiplicative knowledge, on the other hand, takes some existing understanding and greatly increases it. Because of this, multiplicative knowledge is much more efficient than additive knowledge, and you should exploit this wherever you can.

This means that while you work with students, you should leverage their existing knowledge into mastery of the material. This is also why the Socratic method is so effective. Concretely, this means pressing them on their current understanding of the relevant concepts, and showing them how to tie the pieces together to achieve something much greater (to take CS 70 as an example, this happens when we take counting to a logical extreme and show it is the foundation for discrete probability).

Conversely, any value multiplied by 0 is still 0. This is where much of the friction occurs when students are struggling (this is another way to characterize the “broken futon” effect). When you are working with students who are struggling, you may forgo answering their questions with questions in favor of providing more foundational, additive knowledge.

The most common form of additive knowledge is lecture. While incredibly inefficient (despite its popularity), the initial exposure is necessary for learning. Refer students to lecture materials as appropriate to either expose them to the concepts, or refresh their memory.

Many veteran instructors are accustomed to providing multiplicative knowledge so as to maximize efficiency, and consequently, maximize student understanding. The best instructors, though, can recognize when they are trying to multiply 0, and revert to additive knowledge as necessary.

# Learning styles

- Learning Styles Don't Exist
- The Biggest Myth In Education

The idea of learning styles as most of us know it (visual, auditory, etc) not only has failed to be shown in studies, but also was not founded in any science to begin with! This alone should be enough to dismiss the notion out of hand, yet it remains a tantalizingly convenient way to classify students.

If you glean nothing else from these videos, this is perhaps the most important takeaway: learning is about repeated exposure to materials through multiple different perspectives. The more you can find ways to present the same material to your students in different ways, the more likely they are to learn the material. You never know which intuitive explanation will resonate with a student, so it’s best to try as many as possible!

# Working in groups

There are two main reasons to talk about groupwork: a team project, where the team's grade is proportional to each group member's individual grade, and for informal study groups. In either case, the benefits of working in a group are not automatic! You can't simply put students in groups and expect that to create anything more than several students independently working next to each other.

## Issues beyond basic group dynamics

First, it is important to note that there are many factors outside of workload distribution and skill disparities between group members. There are documented cases of harassment and discrimination preventing students from being able to work in groups. These things happen more often than you may think, and are often not as overt as the online training modules make it seem. Solving these problems systematically is not easy, and addressing these problems requires individualized attention. Be extra vigilant about situations like these! There are efforts on campus to use software to help group students such that they offer self-identifying information, and get grouped with similar students.

## Measures of group success

Perhaps surprisingly, a team's "intelligence" is not simply the sum of each member's intelligence. Rather, the best predictor of a group's success is how strong the psychological safety norms are within the group. That is, how comfortable members are speaking up (and potentially being wrong), how well they know how others will receive their statements, and distribution of group talking time are more important indicators than things like variance in expertise or experience.

## Group health checks

When checking in on groups, you will want to check on these dynamics within the group. The easiest way to do this is to use a Likert scale (1-5 scale, with 1 being "strongly disagree", and 5 being "strongly agree") and ask each member the following:

- My contributions to the discussion are encouraged and welcomed
- My teammates are mindful of how their remarks or reactions affect other group members' feelings
- If I make a mistake on our team, it is not held against me
- When my teammates say they'll do something, they follow through with it
- Our team has an effective decision-making process

These answers will give you a good idea as to whether the psychological safety norms are present in the group, and if not, which avenues you should approach to remedy the situation.

# Review sessions and office hours

## Make expectations clear

Be it a review session, guerilla section, or office hour, make sure students know what to expect. It's not great if, for example, students come to a guerilla section thinking that they'll be able to get a lot of 1-on-1 help (they are intended for students to work with each other). By clearly communicating to your students what the format will look like, you decrease the chances of anyone being disappointed after they show up.

## Find a room conducive to groupwork

This isn't always possible, as the number of review sessions in HP Auditorium makes evident (HP is a nice place, but it's not the best for encouraging collaboration). In Soda, the Woz is a great room for promoting groupwork. In general, rooms with moveable desks or large tables will be better than lecture halls.

## Group students who are working on the same thing

Not only will this help you navigate through student questions more efficiently, it gives the students opportunities to work together with their peers to come up with solutions together. Sometimes, even though a few students are working on the same assignment, their questions may be very specific, or they may be struggling on different parts. This is a good thing! They will be able to help each other on the parts they each know, and can subsequently combine their resultant questions for you, saving time for everyone!

## Come prepared

Check online to see what kinds of concepts or questions students are asking. Better yet, poll your students to see what they'd like to focus on.

For review sessions, make sure to look at previous exam questions and study those concepts in depth; students will likely be stressed around exam time, and it's your job to make sure you're especially prepared when your students need your support the most!

For projects or homeworks, think about common pitfalls. Look online to see the kinds of questions students are asking. Feel free to ask other staff members if you're confused on a part of an assignment or a concept (it's okay to be confused and ask questions, even as a staff member)! Ask other staff members to see if they can help you get a better sense of what students historically have struggled with in the course, be it a concept or some particular part of an assignment.

## Don't spend too much time with one student at a time

This applies even when you're working with students who are really struggling. Give students something to think through and tell them that you will cycle back to them as you continue to make your way through the

queue. Try to spend 5-7 minutes on a given (group of) student(s). At the same time, don't just give them the answer when you move on; let them stew on it for a bit before circling back!

### Use the queue

If your OH/section is really empty, then feel free to not use the queue. Otherwise, respect the order and cater to folks who came first.

### Ensure adequate staffing

If you notice that some office hours are a lot more packed than others, try suggesting that other TAs move their OH to the more popular hours. If your sessions are often too packed for you to get to everyone (even after grouping people), try to get more lab assistants/readers/tutors to stop by. Don’t be afraid to be vocal about it! Sometimes, there will not be enough resources to help, but most other times, the extra personnel is out there just waiting for an opportunity to help.

## Leave when time is up

Sometimes OH is packed and you feel horrible about leaving. It's okay to stay, but do feel free to leave if you have something to do or if you don't feel like staying. Remember that the semester is a marathon and not a sprint: you need to set a sustainable cadence for yourself that will get you through the entirety of the semester!

# Assessments

Assessments serve to separate students, and by nature, they are stress-inducing. The most common type of assessment is an exam, and thus will be the focus of this section.

## Instruction vs assessment

Class has two main modes: instruction and assessment. During instruction, the main goal is for students to learn. The environment is fully collaborative: students have unrestricted access to other students, instructors, and material, and they can try until they succeed.

During assessment, however, the main goal is for students to demonstrate learning. The environment, while (hopefully!) not adversarial, is no longer collaborative: students' resources are heavily restricted, they only have one attempt, and a score is attached to the result.

As an instructor, you must be intentional about which parts of your class are in which mode, and do your best not to conflate the two. If you are trying to instruct students, they will have a hard time if their resources are restricted. Similarly, if you are trying to assess students, it will be less meaningful if you cannot differentiate whose work is whose.

To that end, exams are, by design, assessments. Therefore, any instruction should happen before after the fact, not during.

### "What's wrong with this code/proof?"

To give a concrete example of when instruction and assessment gets conflated, we turn to the class of problems that presents a solution to a problem, and then asks the student to identify the errors, if any.

While this format can be great during discussion or a review session, it is very difficult to make this a good exam question. This is mainly because in an exam setting, you cannot direct your students, and they cannot read your mind. What level of detail are you asking for? Should they identify the syntax error that you didn't intend to include? For code, is efficiency a concern? Is this some next-level trick question where there is no mistake at all?

In a setting where everyone can talk about the solution and the various errors that may not even be there, these problems are great at generating discussion and achieving the coveted active learning from students. But in an exam setting, it is easy for "find the mistake" to be too open-ended, and too often results in confusion and frustration from the test-takers.

In other words, this type of question makes for good instruction, but is very hard to use for assessment.

## Agree on what you're testing

In addition to the material, students will inevitably also be tested on their test-taking skills. For example, if the format of your course's exam has stayed consistent for many years, the students who study previous exams

will be better at pattern-matching questions than those who only review lecture or discussion notes. As another example, an exam that is designed such that the average student will not finish will also test their time management skills.

As a staff, agreeing explicitly on what skills you are testing will make for a better exam. Once you've agreed, broadcast those skills to your students, and do your best to mitigate everything else. For example, most classes make it explicit that their exams are historically consistent, and overprovision time (broadcast that pattern matching skills will be tested, and mitigate needing time management skills).

# Playtest exams

The staff should individually take the exam as if they are students taking the exam. Write out the answers in full, and record the timing for each question, as well as the difficulty. Note any ambiguous or unclear wording. The more iterations an exam undergoes before being put in front of students, the less likely it is to have errors or be too easy or difficult.

## Caveat about assessing an exam's difficulty

The longer you look at an exam, the easier it will feel. This is because you will become so familiar with the problems (and their solutions) that you will lose the perspective of seeing it for the first time.

# Aspects of a good exam

Below we detail Dan Garcia's 5 criteria for what makes a good exam. Keep these in mind as you write and playtest exam questions for the classes you teach.

## Coverage

First and foremost, the exam should comprehensively cover the material you want the students to understand. In that vein, how much each topic is covered on the exam should reflect how much each topic was covered in class. Having only one short exam question on a topic that was the focus of several lectures, or several questions on a topic that was mentioned in passing, would not give a representative picture of how well the students internalized the material that was presented in class.

## Reasonable time

Before you release the exam, you should have a good estimate for how long students should spend on each question (be sure to base this on the average student, rather than the top or bottom performers). The total time for the exam should accordingly be longer than the sum of the times for each question to allow for the context switches required to move between problems.

## Range of difficulty

An exam needs to have problems with varying difficulty in order to let each student demonstrate their understanding of the material and create a distribution of scores that separates them. If the questions are all

too easy (or too difficult), the resultant distribution will be flat, and will not give you as an instructor meaningful information about how the students are doing.

As a general rule of thumb, if a problem is interesting to *you*, it is too difficult. Remember that you have already taken this class, and therefore are more experienced with the material than your students. If every question on the exam is interesting (or, often, synonymously described as “fun” or “not boring”), your exam will be too difficult, and you risk having at best a bimodal distribution.

## Question variety

Students may have an easier or harder time answering the same question when asked in different ways. For that reason, to give students the best chance to demonstrate their understanding of the material, an exam must have a variety of question *types* (writing code from scratch, parsons problems, multiple choice, etc), as well as questions of varying difficulty. While you don’t need to make every question on the exam a different type of question, you should avoid making every question be the same type.

## Ease of grading

This is an aspect that is often overlooked, especially by newer test-writers! While how easy a question is to grade should not be the most important or only factor, it nevertheless needs to be considered. Staff hours are a precious resource, and the longer it takes to turn around test scores, the more stress it will cause for both the students and the staff.

In that vein, make each part of each problem independently gradable. This means that there should be no cascading penalties, where getting part one wrong propagates and makes all the subsequent parts wrong. One way you can mitigate this is to give students the option of using a variable to denote the answer to a previous part in the current part.

Lastly, make sure each problem has an explicit rubric (that is, if a problem is worth 15 points, the rubric should clearly spell out where each of those 15 points are allocated). This both makes giving partial credit easier, and also makes handling regrade requests more straightforward.

# Academic misconduct

Mechanically, what to do about academic misconduct is straightforward: report any incidents (or suspected incidents) you encounter to your instructor. They will know how to handle it. This section instead will focus on a higher-level discussion centered around academic misconduct.

## Definition of academic misconduct

UC Berkeley defines academic misconduct as such: “Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community”.

Setting aside for a moment that academic advantage or disadvantage is not defined, this definition relies heavily on the word “unfair” to speak for itself. And not only does this definition imply that there are *fair* academic advantages or disadvantages, it equivocates even further in that the action (or *attempted* action!) in question *may* result in an unfair advantage or disadvantage.

So can we do better? As it turns out, not really! What constitutes academic misconduct is inherently ambiguous, and will always carry a subjective component to it. Famously, the US Supreme Court dealt with a similar problem on the issue of obscenity. Ultimately, most courses will give a definition that is not too far from “I know it when I see it”.

Many debates around academic integrity boil down to this ambiguity. If you find yourself in an argument about how to handle a particular case of misconduct, first make sure everyone is clear on what they consider misconduct in the first place. You may be surprised to learn how others come down on this!

## Why students engage in academic misconduct

It may be hard to remember sometimes, but students are rational beings: they will pick the course of action that makes the most sense. At the end of the day, students engage in misconduct because they have deemed it the best course of action. More often than not, it is because they need a specific grade. Whether you agree that grades are a good thing, as long as they exist, students will be incentivized to optimize their scores, rather than their learning. As instructors, it is our job to make sure for students, optimizing their learning lines up as closely as possible with optimizing their grades, while recognizing that they will choose grades over learning when push comes to shove.

### Incentives

In that vein, we as instructors should do everything we can to remove student incentives to cheat. Concretely, this means giving students as much support as possible, while removing as many zero-sum situations as possible. For example, if your course is curved, it’s hard to blame the students for not helping each other when it is not in their best interest to do so: another student doing worse in the class means that they themselves will be higher on the curve. Making your class graded on absolute scoring removes this incentive. If your course’s final is more or less the sole determinant of their grade, it is hard to blame the students for wanting to cheat when the stakes are so high. Having shorter, more frequent assessments can not only help with student stress

by lowering the stakes for each assessment (and therefore reducing the incentive to cheat on that particular exam), it can also help with retention of the material.

### Normalize collaboration

On the topic of “fair academic advantages”, encourage collaboration in your class as much as possible. In addition to the benefits of peer instruction, this removes an incentive for students to cheat on assignments by asking their friends for help (in this case, we remove the incentive by defining the action as acceptable). Any limits you place on collaboration (specifically around copying solutions) should be explicitly spelled out in your course policies.

## Cheat-resistant assessments

While removing incentives makes students not want to cheat, another thing to think about is how to make it harder for students to cheat. A simple example of this is having students take an exam while a proctor is present. This makes it harder for a student to perform illicit actions, both literally and psychologically (since they know they are being watched). Other methods include writing questions that are higher in bloom’s taxonomy (and therefore harder to look up the answers to), randomizing the order of questions (so students are less likely to be working on the same problem at the same time), or randomizing the parameters of the questions themselves (to make it harder for students to copy from each other).

Another way to make it harder to cheat is to allow students to do more things. A common example is to allow students to bring a “cheat sheet” of written notes (or making exams open-book altogether), or to allow students to take extra time.

## Cheat detection

The next step is to make it easy to detect when students cheat. As a note, when presented with a tradeoff between making it harder for students to cheat and making it easier to detect when students cheat, bias towards the former. For this reason, we recommend against “honeypot” questions that are designed to tempt students into cheating with the intention to catch them. Furthermore, because detection necessarily happens after the fact, we believe that prevention is ultimately more effective.

Some common methods of detection include:

- Having proctors for exams
- Keyloggers for online exams (for example, if a student pastes in the correct solution, but with the wrong parameters, that should immediately trigger a detection flag)
- Plagiarism detectors

## Punishments

Lastly, you must deal with all of the detected cases of cheating. It is important here to stay consistent with your course policy (any signs of bias, while being morally wrong, also carry potential liability issues).

# Everything is a tradeoff

All of this builds up to a central point: your time is zero-sum. Any time you spend building detection mechanisms and handling cases of academic dishonesty is time you are not spending on your students. It is time you are not spending proofreading your questions or practicing your presentation.

Anything you put in place to root out and punish wrong-doers necessarily makes the experience for honest actors worse. And while having proctors may be minimally-disruptive, having students record themselves taking the exam (prepended with a 360 recording of their bedroom) can be incredibly stressful.

As a staff, it is important to come to an agreement on which end of the spectrum you want to be when it comes to punishing bad actors vs protecting honest actors. Know that over-indexing on the former will hurt the latter, and conversely, over-indexing on the honest students means that some cheaters will go undetected (and ultimately, unpunished).

# Framework for dealing with academic misconduct

In summary, here is a hierarchical approach to prevent and handle academic misconduct:

1. Remove incentives
2. Create “cheat-resistant” assessments
    a. open-book
    b. higher in bloom taxonomy
    c. randomization (question order, parameterization)
3. Create cheat detection mechanisms
4. Handle cases of detected cheating

# Proctoring and accommodations

For a more comprehensive guide for working with the Disabled Students Program (DSP), refer to the following presentation from Vron Vance: first time gsi DSP intro fa21.

## Accommodations “vs” academic integrity

When talking about student accommodations, the conversation invariably shifts at some point from how to help students to academic integrity. The tipping point varies from person to person, and different instructors will fall on different points of the spectrum of what we will do for students (or allow students to do).

Within this spectrum, there are two thresholds: the first is the “necessity” threshold. Everything up to this point is deemed necessary in order for the students to succeed. In the context of exams, this includes providing a venue for students to take the exam, proctors in the room to answer questions and ensure a fair testing environment, and the most basic things like printing out exams for students.

As an example point of contention, instructors will disagree on whether it is necessary to provide students with scratch paper and writing implements. Instructors also will disagree on whether it’s necessary to provide students with a wall clock/timer or a running list of question clarifications.

The second threshold is the “too much” threshold. Everything above this threshold is deemed too much, to the point where the integrity of the exam comes into question[4]. A simplistic example here is providing the students with answers to the exam during or before the exam itself. But more subtle points of contention include telling students what topics will be on the exam, breaks during the exam, or even allowing students to work together on certain problems.

Much like defining academic dishonesty, when discussing student accommodations, disagreements will arise if different instructors have different thresholds.

### Fairness

Some instructors encourage blanket policies in order to reduce bias and keep consistency across students. On its face, this seems like a reasonable approach, but in practice, this means students in DSP can be turned down via policy, which undermines their accommodations. Specifically, equality seems like the correct approach, but it does not account for the need for equity.

To reduce bias, we should assume that every student has the potential to succeed, and demonstrate that belief through our actions. To that end, accommodating students creates a fairer classroom, and denying student accommodations in fact undermines the academic integrity of your assessment, in that it will not be an accurate representation of student ability.

With all of this in mind, we often talk about proctoring in the context of academic integrity, but proctoring itself should be thought of as an accommodation!

---

[4] Everything between the two thresholds are nice-to-haves: not necessary, but also not dealbreakers.

# Remote proctoring

Below is a condensed summary of Peyrin's Draft:  Remote Proctoring and Detection Strategies.

## Exams are stressful

First and foremost, it's important to recognize that remote exams are not in-person exams. When written out, it may seem obvious, but it's important not to try to recreate an in-person experience remotely, since they are two different mediums.

### Exam security

The feeling of exam security is directly proportional to stress. That is, the more measures you put in place to ensure exam integrity, the more it will stress students out. Stricter policies also have diminishing returns when it comes to exam security, but student stress does not analogously taper off. Therefore, there is a point at which any further measures will only marginally help with academic integrity, while causing students disproportionately more stress. Lastly, consider how your policy affects marginalized or vulnerable groups.

To give a concrete example, suppose you are asking a student to record a 360 pan of their testing room, which happens to be their bedroom. Now suppose this student is uncomfortable around one of the TAs. This TA now has a recording of this student's bedroom. This creates unnecessarily distracting stress for the student, and also raises concerns around privacy.

## The onus should be on staff, not students

Instructions should be short, and the logistics should be abstracted away wherever possible. Furthermore, your tone is just as important as the policy itself. Avoid threatening the students, and assume they are acting in good faith. Playtest the instructions amongst the staff before publishing them, and give students time to react to the rules and ask clarifying questions. In a nutshell, during the exam, students' focus should be on the exam, and not the proctoring.

## Students are entitled to privacy

Explicitly state who will view video feeds, and if recorded (not recommended), explicitly state how long videos will be stored, and where. Lastly, train your staff to understand why this is important. Not every student will be in a position where recording their space is harmless for them. Do what you can to protect the student's privacy, while also giving yourself confidence that they are taking the exam fairly.

# Accessible content

Much of the content here is taken from Michael Ball's Introduction to Web Accessibility (UW) talk.

Unlike academic dishonesty, there is a correct and unambiguous definition for accessibility: "the ability for someone to use a service or tool". In the context of course material, being accessible means that anyone can use the content. Practically speaking, for many content creators, it often means a list of things to keep track of ( DIY Accessibility Checklist for Web Developers and Content Creators ).

## Why is accessibility important?

Analogous to the idea of students only being able to learn if they are in a classroom where they feel comfortable interacting with their peers and asking their instructors questions, students can only learn if they can meaningfully engage with the course material. The first step to this is access. Depending on how you define disability (disability is situational, and is not necessarily visible), and how you ask the question, the answer to "how many Americans have a disability?" ranges anywhere from 1 in 4 to 1 in 8 (from the US Census Bureau). Even taking the lowest estimate, you can expect that on average, 12.% of the students in your class will have a disability. This is a large number of people!

Moreover, there are legal implications for violating accessibility standards. In 2017, UC Berkeley's online video content was found to be non-ADA compliant, and was ordered by DOJ to remedy the situation. Berkeley was unable (or unwilling, depending on who you ask) to pay the costs required to caption all of their content, and chose instead to make the videos private.

To put this in perspective, for a student who has trouble engaging with an audio-only recording, not having captions is the equivalent of not having access to lecture. Not having access to electronic devices in class is the equivalent to not being able to speak. It puts such students at a significant disadvantage, and hopefully you can agree that such a disadvantage is unnecessarily imposed.

The bottom line is that thinking about accessibility is important, and affects a lot of people!

## Everyone benefits from accessibility

Many innovations started as a means for better accessibility, and ended up benefiting everyone. Some examples include curb cuts, ramps, keyboard shortcuts, and even text messaging! When people hear accessibility, many people think about how to accommodate students with disabilities. However, as all of these universally-helpful examples show, *everyone* benefits from increased accessibility. Having captions—indeed, having recordings at all—lets everyone better understand what the speaker is saying (and even speed up the recording to save time). Having a well-designed website lets everyone navigate it easily, without a mouse if necessary (anyone who has alt+tabbed can thank accessibility efforts!).

# Design with accessibility in mind

Designing your content with accessibility in mind is not a set of constraints that make your life harder, but rather an expanded set of requirements that will create a better overall product. They provide some interesting design and technical challenges, and you never know what innovation will become transformative technology!

Moreover, building your content from the ground up with these accessibility requirements is *much* easier than remediating content after the fact! To that end, there are a plethora of online toolkits that help you create websites, and more importantly, get you a bunch of accessibility functionality out of the box. Just as how you do not directly write machine code when programming (unless you are very intentionally operating at that level), when creating a website, you should avoid working with native HTML. Take advantage of these abstractions whenever possible!

For example, bcourses has its qualms, but it does offer good resources for creating accessible web content.

# Social model of disability

This model states that people are disabled by barriers in society, not by their impairment or difference. This is an important mindset shift, and frames the challenge of accessibility in the context of removing barriers, whether they are physical or societal.

A concrete example of this is corrective lenses for impaired vision. Not many people who wear glasses consider themselves disabled. This is because we as a society have removed this barrier for access. A course staff member would be laughed off campus for denying a student access to their glasses during an exam for fear of giving them an unfair advantage. Glasses are so universal that they are not considered an accommodation anymore, and the societal stigma for needing them has virtually vanished. As content creators, we should strive to remove as many barriers to access as possible, to the point where the idea of not having those accommodations would seem as laughable as not allowing glasses[5].

# This is just the tip of the iceberg!

Websites are just a small fraction of the total scope of accessible content. This section will not make you an accessibility expert; rather, it is geared towards promoting awareness of this topic, and give you some basic tools to start doing and learning more.

[5] As some additional food for thought: things like corrective lenses and left-handed desks are so ubiquitous that we scoff at the idea that it gives anyone an unfair advantage. Yet, for students who need extra time on exams, reduced distractions, or breaks, suddenly we start getting nervous. Why is this? What is it about these accommodations that make us uncomfortable? Can we move to a world where these barriers to access can be removed?

# Section II

Course slides

# CS 375

Week 0: introductions and some food for thought

# What is CS 375?

- It's a seminar
  - Space to talk with fellow first-timers
  - Opportunity to share experiences and get/give advice
- Most of your learning will come from actually teaching your sections/labs
  - This class offers a space for you to debrief and regroup.
- Goals:
  - Think critically about your teaching
  - Consider different scenarios that might arise (and how to deal with them)
  - Get you to genuinely enjoy teaching!

# Expectations

- Be here the whole time
- Be active in class (there will be group activities)
- Do the assignments on time (there aren’t that many)

# Requirements

- Self reflections
- 2 Peer observations
- Mid-semester survey
- Attendance

# Introductions

- Who am I?

# Introductions

Who are you? [group activity]

- Introduce yourselves!
  - Name and pronouns
  - Year
  - One thing you're excited about
  - One thing you're worried about

# Teaching fears

Common fears

- Not knowing the answer
- Technical difficulties
- Presentation skills
- Making a mistake

# Growth mindset vs fixed mindset

[video] https://www.youtube.com/watch?v=Xv2ar6AKvGc

[video] https://www.youtube.com/watch?v=hiiEeMN7vbQ

# CS 375

Week 0: classroom climate

# Imposter syndrome

- You don’t have this, you experience it
- It doesn’t matter how you got here
- “fake it til you make it”?
- Your classroom climate directly affects this

# Expert blindness

Teach someone how to make a U-turn

…who doesn’t know how to drive

# Stereotype threat

[video] https://www.youtube.com/watch?v=1oVs3Uxv7SM (4:17)

[video] https://www.youtube.com/watch?v=failylROnrY (8:18)

# DEIB

- Diversity
  - Having people with different experiences and backgrounds
- Equity
  - Treating each person objectively and fairly
- Inclusion
  - Creating space for people to participate
- Belonging
  - Making people feel welcome when participating

**You need all 4!**

# DEIB (throwing a party)

- Diversity
  - everyone is invited to the party
- Equity
  - everyone has a ride to the party
- Inclusion
  - everyone gets asked to dance at the party
- Belonging
  - everyone gets to choose which song is playing while they're dancing

**You need all 4!**

# Classroom activity

[group activity]

What are some things you plan to do to improve your classroom climate? For each thing, which of DEIB are you addressing?

# Avoiding non-inclusive content

Avoid:

- assuming familiarity with culturally-specific references (memes, movies, sports, music, etc)
- politically/emotionally charged examples from current events
  - violence/death, historical figures, “personified” memes (eg “Karen”)
- cultural assumptions (marriage/family customs, etc)
  - be aware when you are making assumptions about “defaults”
- warning words
  - “the familiar…”
  - “you’ve all heard the story of”
  - “I’m sure you all know”

Pamela Fox’s Guide to CS Inclusive Content is a great start!

# CS 375

Week 0: first day prep

# Learning styles?

[video] https://www.youtube.com/watch?v=sIv9rz2NTUk

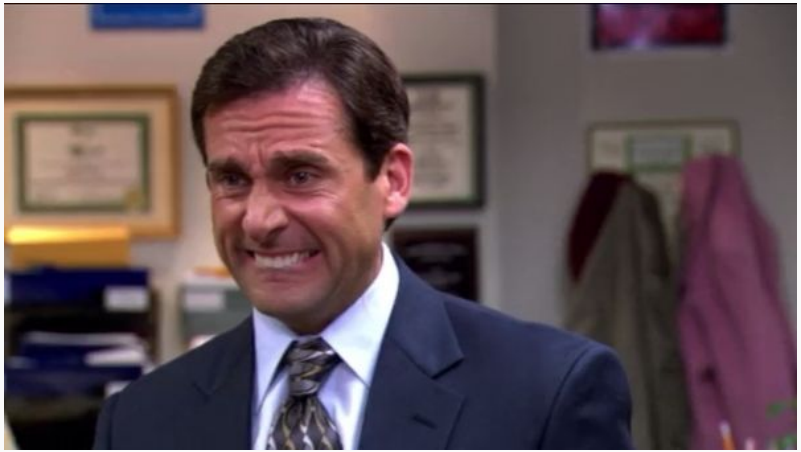
[video] https://www.youtube.com/watch?v=rhgwIhB58PA

# Tips for first day

# Get markers

- Front desk of Soda has them

# Be excited!

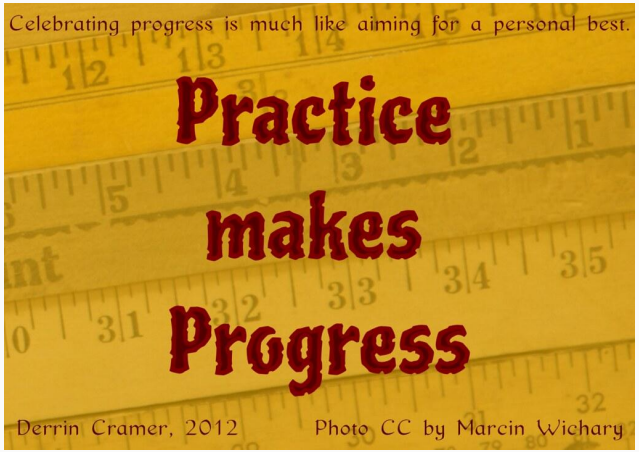


Externally, the main difference between excitement and nervousness is whether you are smiling (to an extent)

# Breathe


- Take a full breath between sentences
- Use that breath to reset yourself
- A big, slow breath gives you time to plan your next sentence

# Practice




- You cannot overprepare
- Scout room beforehand
- Check equipment
- Solve worksheet problems on your own
- Keep notes on-hand

# Pace yourself

If you finish the worksheet, you either went too fast, or the worksheet is too short (or both)

# Never solve something on the fly at the board

- Repeat after me: “I don’t know, but I’ll get back to you”
- No need to speculate if you need more time
- Much better to present it well than risk confusing students

# Good luck!

# CS 375

Week 1: how to present and answer/ask for questions

# Announcements

- Make sure your posts follow the right format
- We don’t ask rhetorical questions

# Self Reflection followup

Do one after every class!

(Keep it short)

# Self Reflection followup

“Address all genders/different ethnic groups”

- Not a quota, but rather to promote awareness

# Self Reflection followup

- Some of you went off-book already, and it didn’t end super well!

# Debrief your week! [10 minutes]

# Debrief your week!

## [class activity]

What went better than expected?

What do you wish you had known?

# Remote sections

- Be a streamer
- Cameras, yes/no?
- Getting student participation

# Presentation

# Advice from a performer (not me! an actual clown!)

- Being confident on stage is partly about focusing on anything but yourself
- Focus on the audience, the story, the questions - anything but how your performance reflects on your worth as a human
- Focus outward, not inward

# Technical Challenges

- Speak too fast ⇒ unintelligible
- Speaking while back turned to audience
- Mumble/voice falls off at ends of sentences
- Not making eye contact while speaking

# Board work

- Plan your flow
- Erase entire board
- “Back of the room” line
- Don’t talk and write at the same time

# Misc tips

- Set precedent early for student participation
- Slides: pros and cons
- Style: make it yours

# Answering questions

# Show, don’t tell

- Don’t interrupt!
- No one cares if *you* know the answer
- Use the whiteboard
- No hand-waving

# When to answer with a question

- Conceptual: **yes**, definitional: **no**
- “What are you trying to do? What do you know?”
- Rubber duck debugging

# Phrasing matters

- “You should know this already”
  - “This was mentioned in X”
- “This is obvious”
  - [Just say it]
- “guys”
  - “y’all”

# Phrasing matters

- Even more important when not face-to-face
- Assume you can’t convey tone in writing
- Say “good question”

# Activity: rephrase that

# Let me rephrase that

[class activity]

- What are some phrases you've heard or been told that didn't land right?
- What about them didn't feel right?
- How would you rephrase them?
- How is the rephrasing more inclusive?

# Activity: tongue twisters

# She sells seashells by the sea shore

1. Pair up (designate person A and person B)
2. Person A chooses a tongue twister
    - Note: (x3) means say it 3 times
3. Person A speaks twister, Person B tries to repeat
    - Person B: do **NOT** look at sheet
4. Repeat step 3 until correct
5. Switch roles

# Alternative if remote

- Capture audio (only) of yourself presenting during a section, giving a talk, etc.
  - *Why audio only?*
- Play it for someone who did ***not*** grow up speaking U.S. English. “Qualitatively, how difficult/easy was it to understand my words?"
- **OR:** see how well YouTube performs on auto-captioning

# Parting words for presentation

- Speak slower than usual
- Plan out your sentence
- Take a full breath

# CS 375

Week 2: teaching confused students

# Announcements

- Makeup assignments: summarize your thoughts on lecture (you can't just answer the questions in the piazza post)
- Self Reflections:
  - make sure they are Questions (not Notes)
  - make sure they are visible to Instructors (not just me) **or you won't get credit**
    - there are Readers for this class who do the grading
  - link to previous post (just use @, no URL)
  - you can remove the bullet points if you've written > 2 reflections
- First video observation is due by the end of week 3 (that's next week!). Partner up if you haven't already

# Self Reflection followup

- Learning names is hard
  - [Avoiding someone because their name is hard]
- Poor handwriting: write bigger
- Don’t worry about filler words (for now)
- Pacing
  - Cater to “middle third”
  - Set checkpoints for yourself
  - Make sure to leave when class is over
- Engaging shy students
- [Do people understand the late policy?]

# [Debugging example]

# Example: helping a student debug their code

```
1  def depth_first_search(root, goal):
2      stack = [root]
3      while stack:
4          node = stack[-1]
5
6          if node.value == goal:
7              return node
8
9          for child in node.children:
10             stack.append(child)
11     return None
```

# Explanations vs Dispelling Misconceptions

# Refresher

- Is it better to confuse your students?
  - Active learning is key
  - Let everyone know you’re presenting a misconception

# Activity: be confused

# Activity: be confused

- [class activity]
  - [If doing makeup assignment] Write a paragraph on a topic, how you think students will be confused by it, and how to plan to address misconceptions

# CS 375

Week 2: Flipped classroom and peer instruction

# Announcements

- First video observation is due by the end of week 3 (that's next week!). Partner up if you haven't already
- Previous post: use @ notation (not full url)
- If you didn't teach a day that you're "supposed" to, make a post that says you didn't teach
- Many of you are "missing" reflections; please reconcile this asap

# Some helpful links for student resources

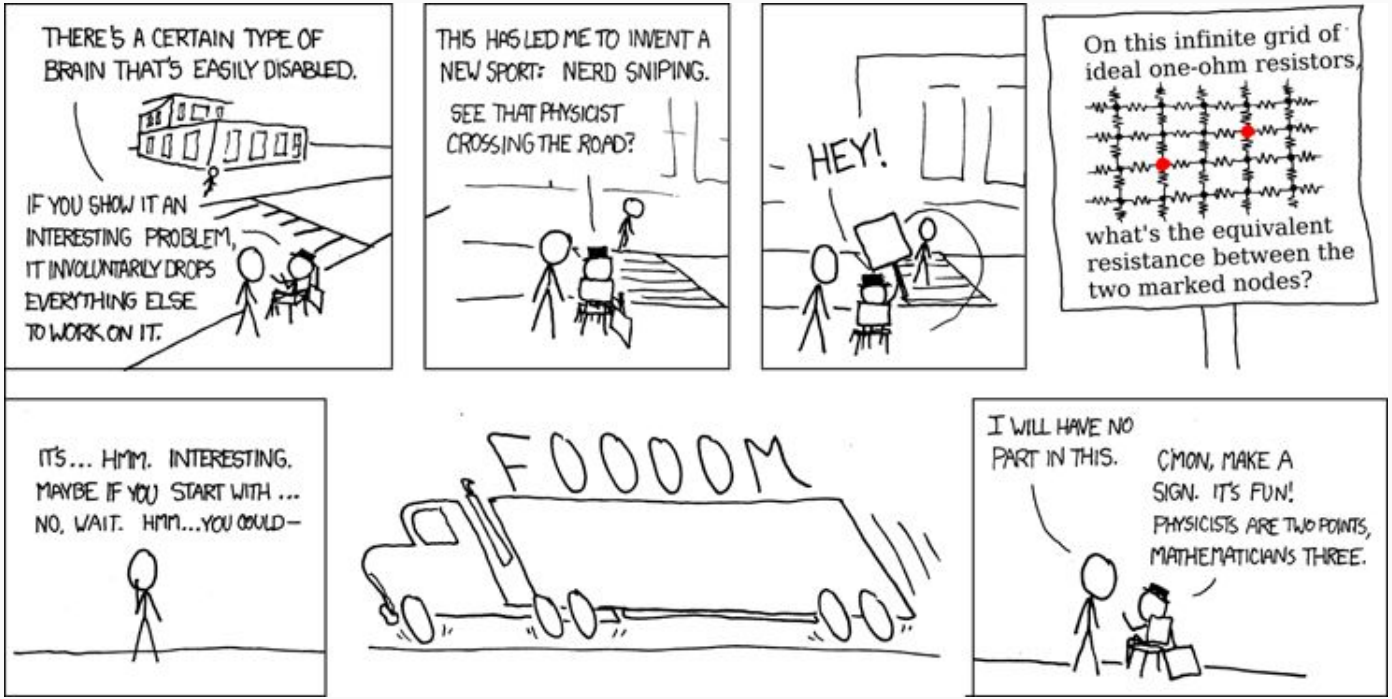
- Incident reporting: https://eecs.berkeley.edu/resources/students/grievances
- Therapy assistance online: https://uhs.berkeley.edu/tao
- UCB Gold Folder: https://uhs.berkeley.edu/counseling/counseling-and-psychological-services-caps/getting-help-students-concern/gold-folder
- Staff well-being: call **510 642 9494** for same-day counseling

# Self Reflection followup

- Projector issues: same room? coincidence?
- People are gonna shuffle around (attendance)
- Cold calling: can it be done?
  - When to ask for answers from “someone new”
- Intentionally bring fewer worksheets than people
- Try to look at student solutions before asking them to share
- Walk around the classroom when people are working
  - “who’s done? who wants more time? who’s lost?”
- Give at least 10 minutes per problem (lecture less!!)
  - decide ahead of time which one(s) you *must* cover
- If your section is consistently small, can advertise to the entire course
- Recovering from mistakes is more important than trying not to make them

# Self Reflection followup

## Don’t get nerd sniped! (credit to xkcd for the term)



# Encouraging questions

- We are conditioned for call and response
  - “Does this make sense?” -> “Yes”
  - “Does anyone have questions?” -> “No”
  - Note: this is (probably) not biological, but is definitely cultural

- Possible “statement” questions
  - “Someone ask me a question.”
  - “I just threw a lot at you. Tell me which part I should explain again.”
  - "Someone tell me which part didn't make sense; it's ok to say none of it did!"
  - “This part is very complicated; I’m ready for your questions!”

# Why UCB?

# Why UC Berkeley?

[video] https://www.youtube.com/watch?v=e1DnltskkWk

[class activity]

List 3 reasons why a UCB degree is better than a library card

# Active learning, peer instruction

[video] https://www.youtube.com/watch?v=FUY049rIjdM

# So, what about lecture?

- What is the point of lecture?
- Can we do better?

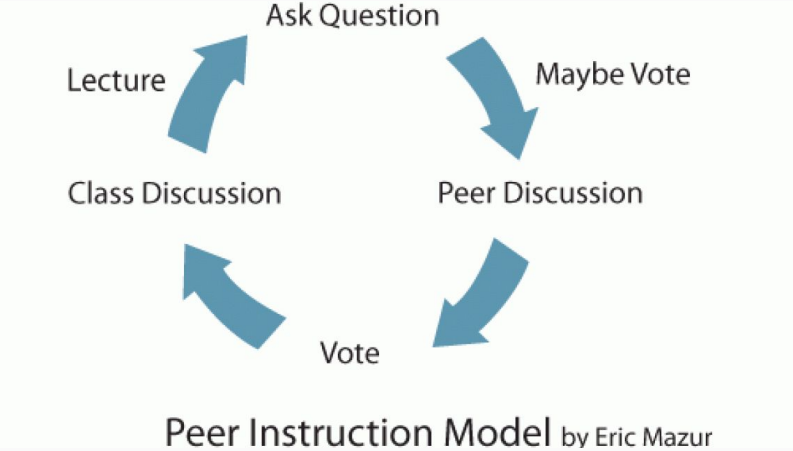
# Inverted classroom

- What is it?
  - Students do assignment(s) beforehand, spend class asking questions and solving problems
- Does it work?
  - Students don’t like doing things on their own
- How do we fix it?
  - Lecture is pre-work, discussion is inverted classroom
  - Moral of the story: you as the TA get the fun part

# Ideas for structuring class

- Peer instruction
- Pair programming

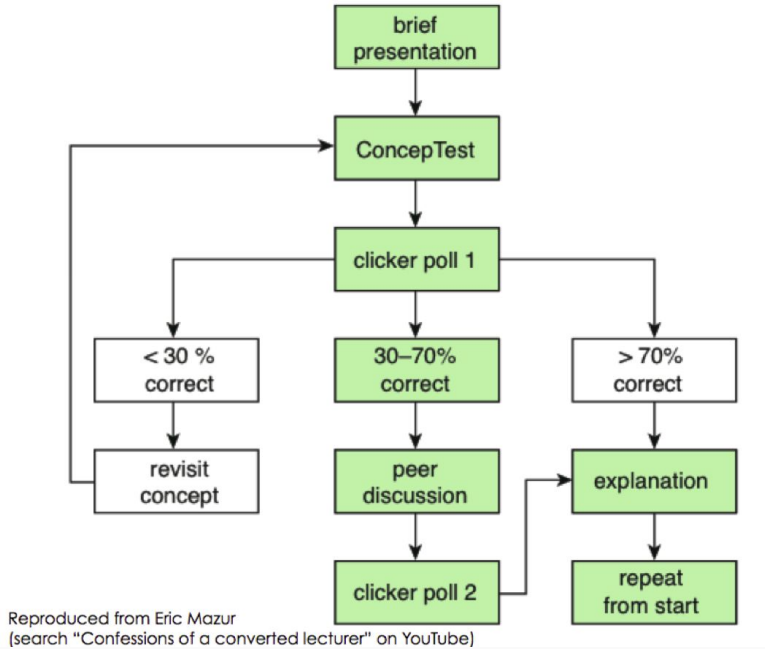
# Peer instruction



Peer Instruction Model by Eric Mazur

1. Present problem (multiple choice is easiest)
2. Wait for **80%** responses
3. Based on correct answers:
   - > 70%: show solution
   - 35% - 70%: discuss with peer
   - < 35%: reteach concept, try again
4. Show answer distribution before/after to class

# Suggested cycle for discussion



Reproduced from Eric Mazur
(search "Confessions of a converted lecturer" on YouTube)

- The questions here correspond 1:1 to worksheet problems
- Group work can replace the “ConcepTest”
- A simple poll can replace clickers:
  - Who is done
  - Who needs more time
  - Who is lost
- Keep lecture to a minimum!
  - Primary purpose is to give a refresher on the problem they are about to work on

# Pair programming

- Side-by-side, working on same machine
- Two roles: driver and observer
- Pair should switch roles often

# Driver

- Does the typing
- Thinks tactically about how to complete the current task
- Explains thoughts while typing

# Observer

- Reviews each line of code as typed in
- Acts as safety net for the driver
- Thinks strategically about future problems
- Makes suggestions to driver

# Pair programming: dos and don’ts

Do:

- Reach a consensus before moving on from any line
- Before the driver types, have the observer suggest what to type first
- Pair with differing experience levels

Don’t

- Let the driver solve the entire problem with no input from the observer
- Stay in the same role the entire time

# CS 375

Week 3: Working in groups

# Announcements

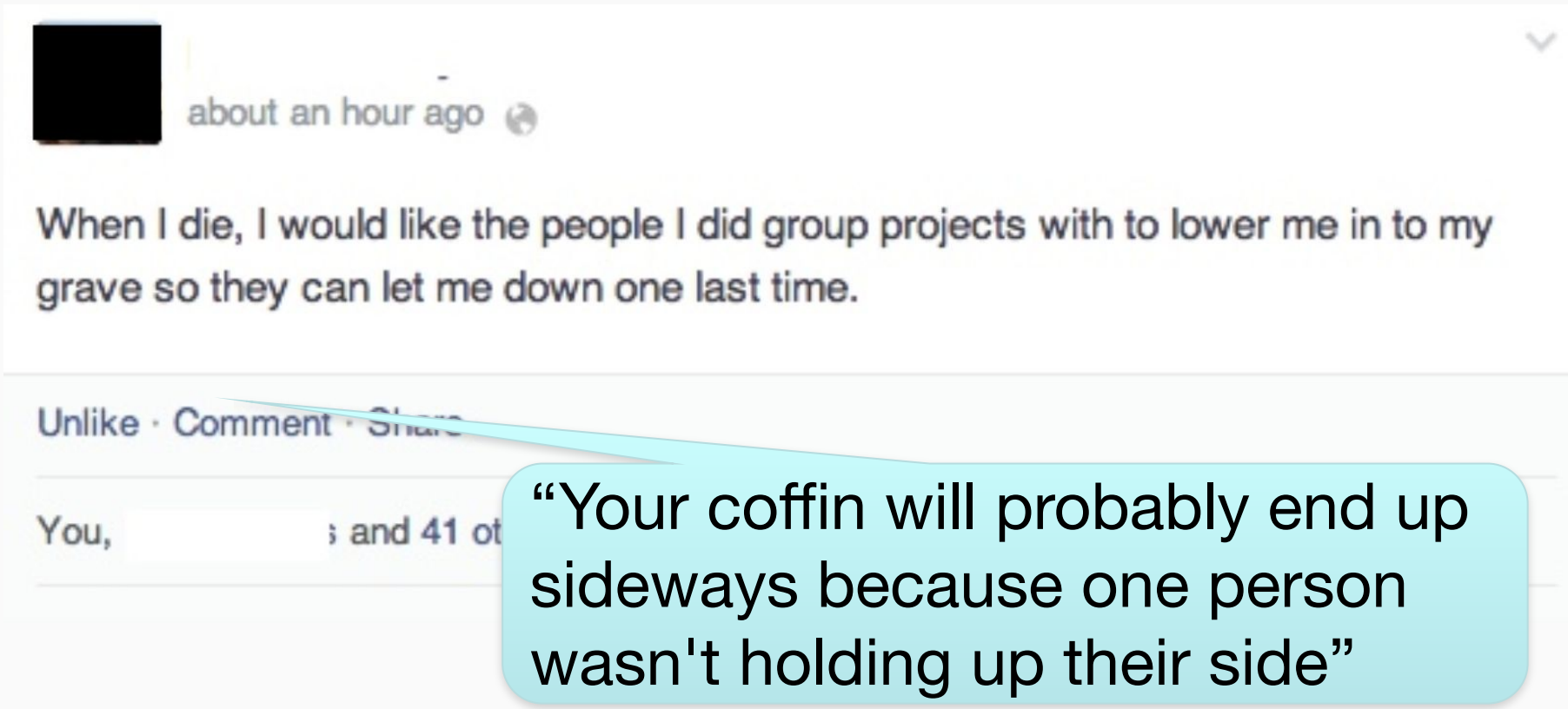
- First video observation is due by the end of **THIS WEEK**
  - No need to submit your video (but **do** watch it)
- Self reflections: use the shortened template (no more bullet points needed)
- For next Monday: bring exam questions

# Self Reflection followup

- Lecture vs active learning: [tennis analogy]
- [Anyone get a successful rubber duck?]
- [“Good question”; is it working?]
- AIs: the more direction you give them, the better
- Talk to your students
  - learning about them helps with names
- Don’t forget the positives! (Also don’t try to do everything)
- Raise your own hand to encourage hand raising
- Students are good at identifying problems, not solutions
- If you say the same thing twice, announce it
- When to remove yourself from the situation
- [Remote] make liberal use of the poll feature

# Group work

# How can we prevent this?



# Three real, recent climate incidents from women in EECS (via eecs.link/climate)

1. “less senior” student unable to find project partner
    a. Every male asked rejected request
    b. When males assigned, disengaged in project
    c. Preventing her from collaborating, struggling to find peers to work with
2. Romantic advances from more senior (male) student in group
    a. When rejected, the male student and his friends began spreading untrue rumors about her
    b. Not comfortable talking to instructor/advisor since she knows they have a strong relationship w/male student
3. Similar experience as #2
    a. working with OPHD to formalize grievance

# What’s the moral here?

- These things happen more often than you may think (not necessarily overtly)
- Solving these problems systematically is not easy
- Addressing these problems requires individualized attention
  - This is a big reason why progress is so slow

# 2 reasons to discuss teams…

- Actual team project (team grade ~ individual grade)
- Informal study groups
- In both cases, benefits aren’t automatic

# Group discussion about groups

[class activity]

- What is your experience working in groups?
- What has (or hasn't) worked?
- What could you try to improve your students' group-work experience?

# Team formation method

- Self-select (maybe w/constraints or recommendations) or instructor-assigned?
  - random assignment same or worse than other options, and elicits student complaints [1]
  - students “happier” when self-selecting; pedagogical evidence inconclusive
- Logistical considerations
  - regular GSI meetings? better to all be in same section
  - self-selecting teams may have compatible schedules (for work sessions/team meetings)
- OK for same team to span multiple courses [2]

[1] Chapman, K, et al. *Can't we pick our own groups? The influence of group selection method on group dynamics and outcomes.* J. Mgmt. Educ. 30(4), Aug. 2006, pp557-569

[2] D. Coutu, “Why Teams Don’t Work” (interview with Prof. J. Richard Hackman), Harvard Business Review, May 2009. https://hbr.org/2009/05/why-teams-dont-work

# Cons of self-selected teams*

- Things instructor cannot control
  - incentive to cheat?
  - social protocols may override fair division of labor
  - fewer opportunities to build team skills such as conflict resolution
  - unrealistic compared to industry
- Things that instructor could control
  - homogeneity in skills, skill levels, “groupthink”
  - may disadvantage/isolate at-risk/minority students who don’t have sufficient network to form a team
- Either way...
  - team composition effects are real
  - instructor should set social expectations for team functioning

* Barbara Oakley et al. Turning student groups into effective teams. J. Student-Centered Learning 2(1), 2004, 9–34

# What makes a successful team?

- Team intelligence ≠ sum of members' intelligence
- *Psychological safety norms* (how teammates treat each other) that predict team success [1]:
  - equal distribution of conversational turn-taking
  - "social sensitivity" (how my remarks affect others)
  - *percentage of women on the team*
- result: all feel it's OK to speak up/say risky things, vs. "experts" dominating sub-conversations

[1] Anita Williams Woolley, et al. Evidence for a Collective Intelligence Factor in the Performance of Human Groups. Science 330, p.686 (2010); DOI: 10.1126/science.1193147

# Victor’s takeaways for good groups

- Team cohesion is more important than skill gaps
- Every group needs a decider
  - This does not mean they have unilateral control
- Groups need regular health check-ins
- Be specific with group assignments

# Check for group health

Survey questions (1-5, or “strongly disagree” → “strongly agree”)

1. My contributions to the discussion are encouraged and welcomed
2. My teammates are mindful of how their remarks or reactions affect other group members’ feelings

# Likert-scale team survey

From Project Aristotle, Google's research-based effort to make teams effective:

1. **Psychological safety** - "If I make a mistake on our team, it is not held against me."
2. **Dependability** - "When my teammates say they'll do something, they follow through with it."
3. **Structure and Clarity** - "Our team has an effective decision-making process."
4. **Meaning** - "The work I do for our team is meaningful to me."
5. Impact - "I understand how our team's work contributes to the organization's goals."

# Optimal tech team size? TL;DR: 4-6

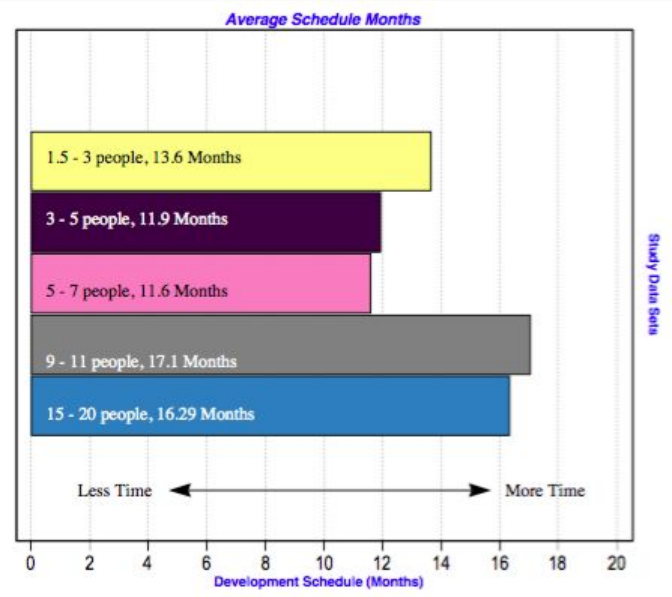
- O(n) parallelism requires O(n^2) communication
  - “2-pizza” teams, Brooks's Law
- Ringelmann effect (1913: loafing as team size increases) kicks in at >5 people
  - (1974: effect *not* attributable to poor communication [1] )
- J.R. Hackman (~50 yrs of team research @HBS):
  - >6: performance problems "grow exponentially"
- Scott DeRue, PhD, UMich: 5-10 [2]
- L. Maccherone: ~No productivity/quality difference between Agile teams of 5-9 vs 10-12 (Lean Kanban N. Amer. 2013)
- **Team diversity:** More diverse = more creative: *experiencing & resolving task related conflict makes teams great* (Hackman)

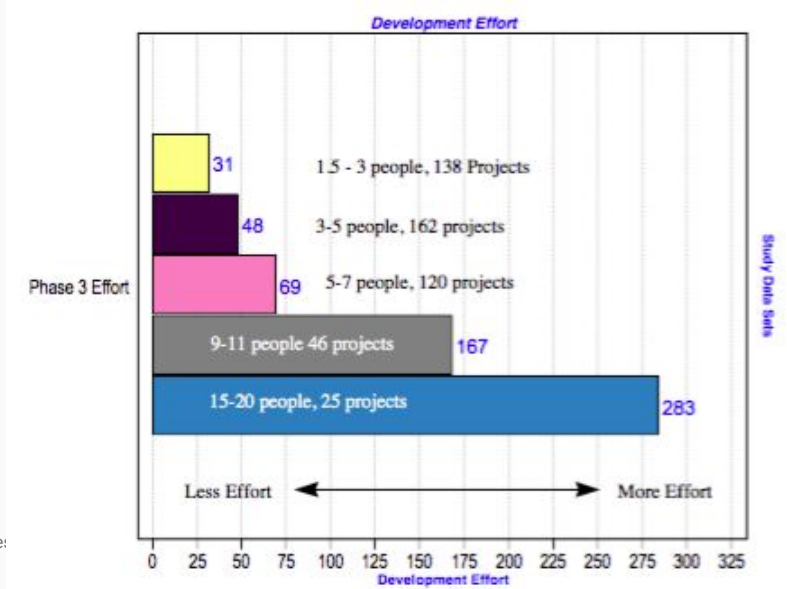
[1] Ingham et al.,*The Ringelmann effect: Studies of group size and group performance*. J. Exper. Soc. Psych. 10, 371–384.
[2] Scott DeRue, *Leading Teams* (MOOC on Coursera), Lecture 3, 10:45

# But…software project team size

Putnam & Myers (1998) study 491 projects 35K-95K LOC [1]

Small groups *finish faster…* and in *fewer person-months*



# JR Hackman (HBS) on Team Composition

"Third, [avoid] composing teams that are too large and too homogeneous in membership. My rule of thumb is that no work team should have membership in the double digits (and my preferred size is six), since our research has shown that the number of performance problems a team encounters increases exponentially as team size increases. Homogeneity of membership is a frequent problem because each of us works most easily and comfortably with people like ourselves. I would no doubt get along very well in a group whose other members also are middle-aged white male pipe-smoking professors. We might very much enjoy our time together. But our creativity would be higher if our group had a diverse mix of members—people who have real substantive differences in their views about how the work should be structured and executed. It is task-related conflict, not interpersonal harmony, that spurs team excellence."

Mallory Stark, *Leading teams: setting the stage for great performances—the five keys to successful teams*, book excerpt & Q&A with author J.R. Hackman, HBS Working Knowledge series

# Reminder: bring exam questions

For next Monday, bring:

- One exam question you think is a **good** exam question
- One exam question you think is a **bad** exam question

Make sure the questions are from the course you are TAing!

# CS 375

Week 3: Exams

# Announcements

- Survey due by the end of next week (details in piazza)
- Watch your videos and respond to your observations (permissions should be updated now)
  - Responding in the “student answer” box helps with grading
- Self Reflections
  - Reminder: you can use shortened template
  - If you’re making up a week, don’t split up the days into separate posts

# Followup from last week

- Collaboration: sharing code?
- “This problem is really hard”
  - Day-to-day is easy, systemic change is hard
  - Identifying occurrences simply requires heightened attention
  - Not a permission structure to disengage
  - Use my awkwardness as an example: do more than nothing

# Self Reflection followup

- Who to look at: student when being asked, audience when answering
- Filler words: 3-step plan to address

# Exam questions

# What makes a good exam question?

[class activity]

- List 5 criteria for a good exam question (use the ones you brought to promote discussion)

# Dan’s 5 fingers make a fist

1. Coverage
    - should be proportional to coverage in class
2. Reasonable time
    - points should correlate with time required
3. Range of difficulty
    - need to differentiate performance
4. Question variety
    - different *types* of questions
5. Ease of grading

# Bloom’s taxonomy: question focus

- **Recall**. Who painted Guernica?
- **Understand**. Describe the subject matter of Guernica.
- **Apply**. Relate the theme of Guernica to a current event.
- **Evaluate/Analyze**. What compositional principles are used in Guernica and how do they inform your opinion of Guernica?

# SOLO taxonomy: learning-outcome focus

## Structure of Observed Learning Outcomes (SOLO)

- **Unistructural**. Who painted Guernica?
  - recall of one fact/concept
- **Multistructural**. Outline at least two compositional principles used in Guernica.
  - some understanding of *multiple* concepts, but unrelated
- **Relational**. Relate the theme of Guernica to a current event.
  - *how* multiple concepts relate to each other
- **Extended Abstract**. What do you consider Picasso was saying via his painting of Guernica?
  - synthesize/generalize/extrapolate based on understanding of related set of concepts

# Example: targeting higher levels

- ✖ Ricardo's Principle of Comparative Advantage states that…
- ✖ Which of the following is an example of applying Ricardo's Principle of Comparative Advantage? [apply/multi-structural]
- ✖ Use Ricardo's Principle of Comparative Advantage to decide which scenario yields higher overall productivity. [evaluate/relate]
- ✖ Choose an appropriate economic principle to decide which scenario yields higher overall productivity. [analyze, evaluate]

# Agree on what you're testing

- Problems "just like" the homeworks/quizzes
- Questions that build on HW assignments?
  - as long as HW was recent, and not relying on memorizing things
  - penalizes student who didn't do HW but really understands material?
- Time management
- *"Stretch questions" (extensions* that go beyond problems students have seen)
  - Unfair or just trying to identify top 10%?
  - "Flash of insight" at different times for different students?

# Instruction vs assessment

- Formative (lab, homework)
  - monitor learning, provide ongoing feedback
  - learning occurs during assessment task

- Summative (quiz, exam)
  - time-bounded opportunity to observe what student knows at some instant in time
  - no learning occurs during assessment
  - item =~ one exam question or one “probe” of student knowledge

# Context-free content

- ❌ Assumed familiarity with culture-specific references (memes, movies, sports teams…)
- ❌ Politically/emotionally charged examples from current events
- ❌ Cultural assumptions (marriage customs, family structure, etc.)

Pamela Fox's *Guide to CS Inclusive Content* is a great start!

# Dry-running an exam

- ***One person at a time*** does dry run, ideally has not seen exam content previously
  - Use stopwatch to time every question
  - *Write out* every word *of* every answer to expose ambiguities, help with timing
- After dry run, immediately write notes
  - ambiguous phrasing/answer? (if it's not clear to GSI…)
  - questions where hint/cheatsheet needed?
  - grammatical issues?
- Assign point weights to questions
  - Heuristic: "1 point per minute"
  - I use:  for N-minute exam, design it to take ~N/2
  - dry-run by TA should take ⅓ to ½ as long as a student, so ~N/4 to N/6
- Get the details right
  - Consistent typography (code, explanations,…)
  - Page #s ("1 of 8") in case incomplete sets
  - Separate answer sheets or not?

# Appendix

Miscellaneous exam-writing tips

# Target learning outcome immediately

- Which of the following statements is true? [various statements about unit tests]

- Which characteristic(s) is/are most commonly observed in unit tests? [rephrase choices to focus on characteristics of unit tests]

# Good stems are complete sentences

- You should:
  - [various things to do while refactoring]
- Appropriate activities and goals during refactoring include:
- Which activities or goals are appropriate while refactoring?

# Avoid gratuitous “fill in blanks”

- Mocks and ____ allow you to isolate behaviors in unit tests.

- Besides mocks, what other mechanism allows you to isolate behaviors in unit tests?

# TL;DR: use 3 choices per MCQ

- Theoretical: what is total # choices on quiz?
  - more questions w/fewer choices maximizes information gain about student ability
- Empirical: only *plausible* distractors thwart guessing
  - on highly-polished career tests, this was true for **16%** of 4-option and **5%** of 5-option MCQs
- Caveat: single right answer, single attempt

* Three Options Are Optimal for Multiple-Choice Items: A Meta-Analysis of 80 Years of Research, Michael C. Rodriguez, University of Minnesota, 2005

# Guessing hurts item reliability…

- Pick longest or most scientific-sounding answer
  - make all choices comparably long and use comparable keywords etc. in all of them
- Pick ‘b’ or ‘c’
  - order choices randomly or deterministically (e.g. alphabetical)
  - better: use quiz platform ability to randomize both choices & question order
- Avoid choices containing always/never
- If two choices are opposites, one of them is probably the answer
  - include 2 distractors that are opposites
- True/False questions are more often true

# Randomization can help

- *Order* (of questions and/or answer choices)
- *Pooling* (pick 1 question from pool of N)
- *Parameter* (numeric, string, etc.)
- *Structure* (circuit, code, etc.)
- Combine multiple of the above: 3-question pool of circuit questions, each question randomizes structure and param values

# PrairieLearn from UIUC

- “How much randomness is needed to deter collaborative cheating on asynchronous exams?”
  - tl;dr: **pools** of size 3-4, + randomized params/structure within each question, reduces info-sharing advantage to <3 percentage points

# Exam Preparation Logistics

- Give a deadline!
  - eg “first draft of questions 1 week before exam”
- Make points perfectly clear (e.g. extra credit)
- Review session? give out past exams?
  - if past exams, should be at least similar

# Dry-running an online exam

*Have a practice quiz with “fake” questions to dry-run the platform!*

- VPN issues
- Incompatible browser / plugin /extension
- Cookie issues or other browser settings

  ***Goal:*** *all conditions are identical to the real quiz except for the question content*

Even for “common” platforms (bCourses, Gradescope, etc.)

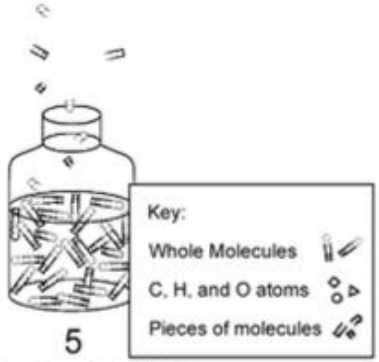
# A taxonomy of machine-gradable assessments

Scalise & Gifford, *Computer-based assessment in e-learning*, J. Tech., Learning & Assessment 4(6), June 2006

| 1) Mult. choice | 2) Select/ identify | 3) Reorder/ rearrange | 4) Substitute/ correction | 5) Complete | 6)Construct | 7) Present/ Open ended |
|---|---|---|---|---|---|---|
| True/false | Multiple T/F | Matching | Interlinear | Numerical | Open-ended mult choice | Project |
| Alt. choice | Y/N with explanation | Categorizing | Sore-Finger | Short-answer & sentence completion | Figural constructed response | Demonstra-tion, experiment, performance |
| Std. mult. choice | Mult. answers | Ranking/ sequencing | Limited figural drawing | Cloze-Procedure | Concept map | Discussion, interview |
| Mult. choice w/"new media" distractors | Complex mult choice | Assembling a proof | Bug/fault correction | Matrix completion | Essay/automate d editing | Diagnosis, teaching |

# T/F or MCQ with explanation

Look at the drawing below:




5

*Note: Molecules are shown larger than actually are

Student A says that this model is correct and accurately represents what is happening when we smell vials of perfume. He says that when molecules leave from the vial to go into your nose they become a gas. In order for a molecule to become a gas it has to break apart into smaller pieces so that it can float from the liquid into the air.

Student B says that this model is incorrect. She says that molecules are stable units. When a smell vial is sitting in the classroom there is not enough energy available to break a bond so the molecules stay together.

With which student do you most agree?

**Question 8**

$f(x) = 3x^2$ is a function.

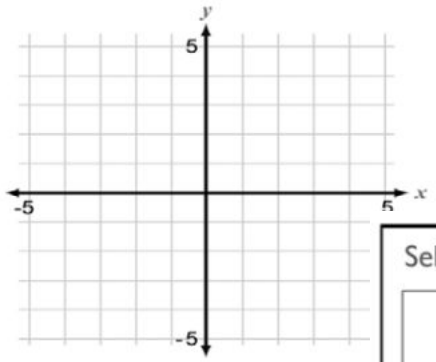
- A) Yes, because each input value has exactly one corresponding output value, and each output value has exactly one corresponding input value.
- B) No, because there are two possible output values for some input values.
- C) Yes, because each input value has exactly one output value.
- D) No, because there are two input values that have the same output value.

If all choices plausible, better discrimination than conventional MCQ

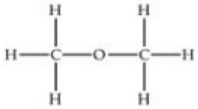
# Selected-response w/nontext media

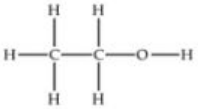
**Question 2**

Click on the quadrant that contains the point (-2, 3).

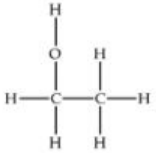


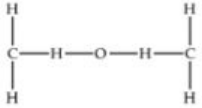

Select ALL the molecules that you think might exist:

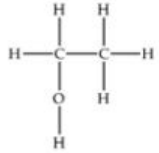
A. 

B. 

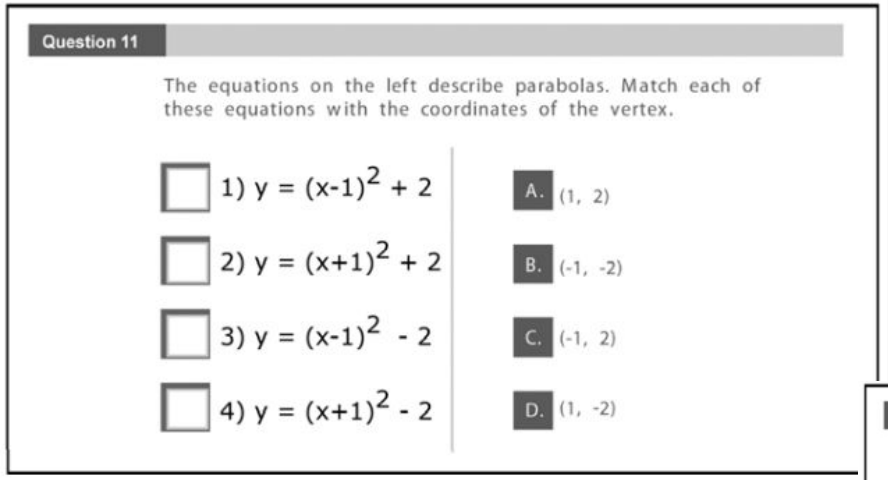
C. 

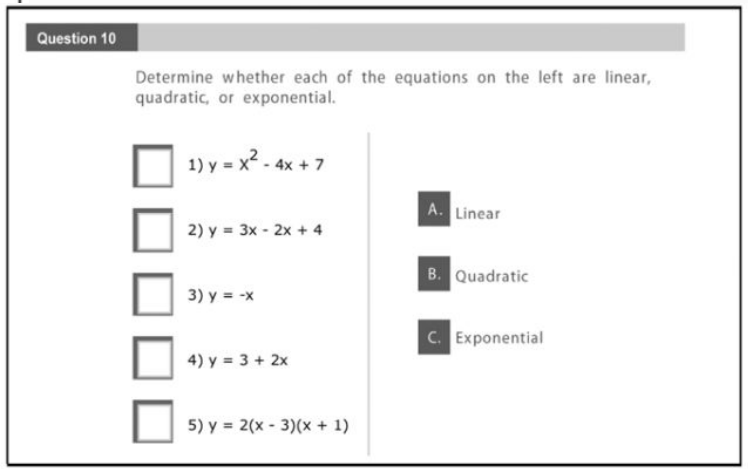
D. 

E. 

F. 

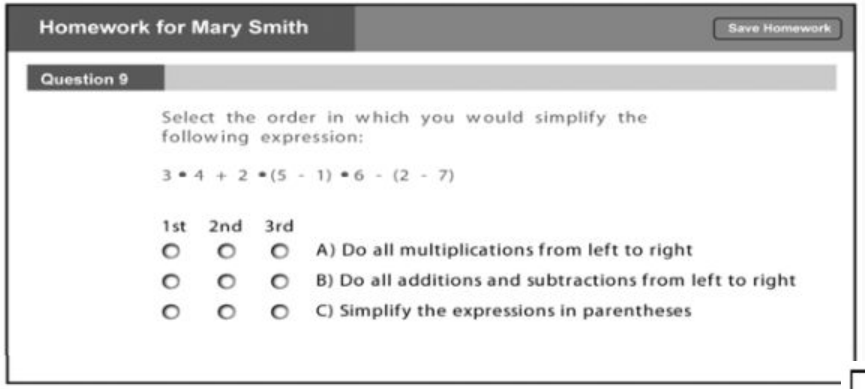
# Matching (1:1), categorizing (1:n)




`pl-matching`

# Sequencing, with or without distractors




`pl-order-blocks`
`pl-faded-parsons`

In the principle of conjunction, if proposition p is a step and proposition q is a step, you may then conclude the conjunction of p and q. Using the list below, select a series of statements that illustrate the principle of conjunction. Please select only the statements that are relevant and order them appropriately to show conjunction.

1. if p
2. if q
3. if not p
4. therefore p
5. therefore p or q
6. therefore p and q
7. therefore p and not q
8. therefore p operates on s for any s in the domain of the variable x
9. therefore q operates on s for any s in the domain of the variable x

# “Interlinear” questions: substitution, correction, etc.

**Question 12**

$g(x) = -f(2x) + 4$

The graph of g(x) is the graph of f(x) stretched [horizontally] by a factor of 2, reflected across the [x-axis] and then shifted 4 units [to the left.]

Mark each of the underlined items below if they are INCORRECT:

The element sulfur (A) is in the same group as oxygen on the periodic table. Sulfur is just below (B) oxygen. Sulfur has 16 protons (C) and 16 electrons (D). It forms as many as 16 bonds (E) between protons and electrons.

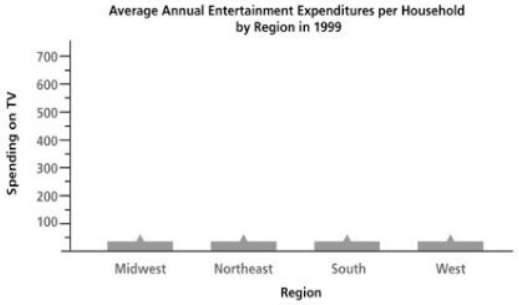
Imagine you have found that molecules with two oxygen atoms tend to smell sweet. You know that ethyl acetate, $C_4H_8O_2$, smells sweet and pleasant. Then you do an experiment to create what you think is the chemical butyric acid, $C_4H_8O_2$, and you discover that it smells not sweet but putrid. To BEST summarize this situation, you could say that:

These two ___1___ have the same ___2___ formulas and they are ___2___ substances.

1. a. mixtures b. elements c. chemicals d. atoms
2. a. structural b. synthetic c. nuclear d. molecular e. tertiary
3. a. the same b. similar c. different

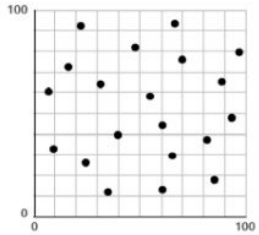
# Figure drawing (pl-drawing)

| Average Annual Entertainment Expenditures per Household by Region in 1999 | | | | | |
|---|---|---|---|---|---|
| | | Entertainment Expenditure by Type | | | |
| Region | Total | Fees | TV | Pets | Other |
| Midwest | $2,067 | $462 | $596 | $373 | $636 |
| Northeast | $1,827 | $505 | $656 | $321 | $345 |
| South | $1,568 | $377 | $570 | $318 | $303 |
| West | $2,269 | $544 | $640 | $381 | $704 |




To complete the graph, click and drag each bar to the appropriate height.

Done




r = 0.00

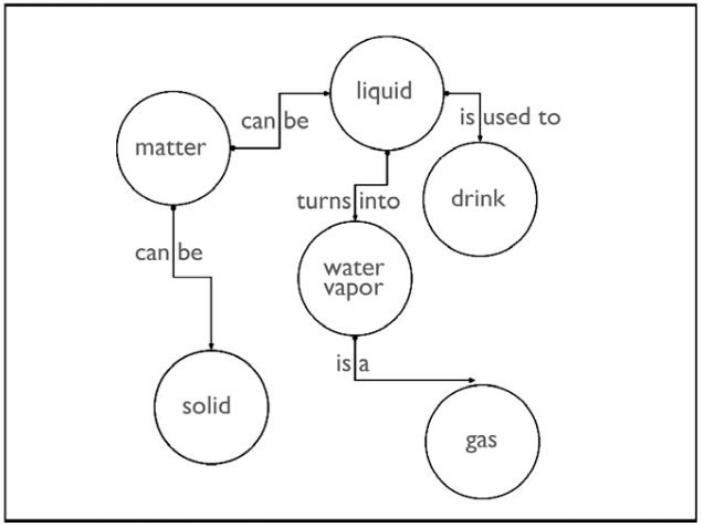
Drag the points on the scatterplot to create a data set with a correlation coefficient of r = -0.87.

Done

# Completion/Construction (table/matrix or graphical)

**Question 18**

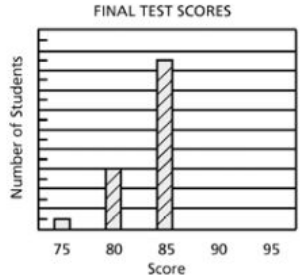
| n | 1 | 2 | 3 | 4 | ... | 25 |
|---|---|---|---|---|---|---|
| f(n) | 5 | 7 | 9 | 11 | ... | |




**2003 NAEP 8th Grade Test Item: Block 2003-8M6, No. 6**

| FINAL TEST SCORES | |
|---|---|
| Score | Number of Students |
| 95 | 50 |
| 90 | 120 |
| 85 | 170 |
| 80 | 60 |
| 75 | 10 |

6. Use the information in the table above to complete the bar graph below.

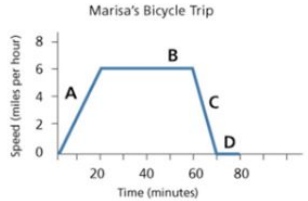



Content Area: Data Analysis, Statistics, and Probability
Mathematical Strand: Procedural Knowledge
Item Class & Type: Short Constructed Response
Item Level of Difficulty: Low (89% Correct)

# “Uncued” Mult Choice: choices cover entire problem space

**DLW Item Class: Matching**

**The graph below represents Marisa’s riding speed throughout her 80-minute bicycle trip.**




**Type the letters A, B, C, or D in the boxes to indicate which part of the graph matches each description.**

- ☐ 1) Marisa was riding at a constant speed of 6 mph.
- ☐ 2) Marisa was increasing her speed from 0 to 6 mph.
- ☐ 3) Marisa’s speed was 0 mph.
- ☐ 4) Marisa was decreasing her speed from 6 mph to 0 mph.

**Type the letters A, B, C, or D in the boxes to indicate which part of the graph matches each description.**

- ☐ 1) Marisa was riding uphill.
- ☐ 2) Marisa was riding downhill.
- ☐ 3) Marisa was riding on level ground.
- ☐ 4) Marisa was not riding her bicycle.

Done

# CS 375

Week 4: Office hours and review sessions

# Announcements

- Survey due by the end of next week (details in piazza)
  - Good opportunity to get feedback
  - Tradeoffs of open-ended feedback
  - If you have a class-wide survey, include questions specific to you
- Respond to video observations
  - the permissions should be correct now

# Self Reflection/Video observation followup

- Wait longer than normal for questions
- Reminder: you do not need to stay late
- The stress of the summer is starting
- [Remote] breakout rooms: let students self-select
  - “loud” and “quiet” rooms
- Sit down (or crouch) when helping students

# Review sessions

# Review sessions

- They’re basically useless
  - … for learning
- Helps reassure students
- Helps direct focus for studying
- Important point is having a review session

# Office hours

# TALC (The Astronomy Learning Center) approach to large O/H

- Students work on labs/HW in collaborative group setting
- GSIs act as coaches/guides, not tutors
- Created by UCB Prof. John Johnson (Astronomy) to serve large-enrollment intro courses
  - Teaching Effectiveness Award Essay, 2002
- Also useful for HW parties, lab, etc…
- [link to pdf]

# TALC “Do”s

- Invite others to work on problem
  - "Is anyone working on problem 2?"
- Groups of 3-6
- Supervise a “student driver” (Don’t drive)
- Give hints to lead student in right direction
- Pick student to "instant replay" solution approach (maybe someone who you're not sure got it)

# TALC “Don't”s

- Don't give answers
- Don't be a grader (e.g. for homework)
- Don't type on keyboard (let students do it)
- Don’t talk at the group, talk "within the group"
  - *Goal is active ownership by students*
- Don't get bogged down working with individuals
  - Get group started, *then walk away*

# Students who seem to need *much* more help

- Can be frustrating since you want to help, but *you have to set boundaries*
- And because you may feel like you're not helping
- If assignment not well "chunked", can you chunk it?
- *Never give answer directly*. Prompt for answer, ask for explanation *whether right or wrong answer given*
    - If correct answer was a guess, student may lack basic knowledge

# CS 375

Week 4: Proctoring and accomodations

# Announcements

- Self reflections can be free-form starting Thursday

# Self Reflection/Video observation followup

- Attendance is going to be inconsistent
- People will want exam prep help during class
- [techniques for getting questions; is it working?]

# Proctoring

# Proctoring

- Integrity “vs” accommodations
- Spectrum of things we do for students; we draw two lines:
  - First line: everything below it is “necessary” (e.g. printing exams and providing a venue to take an exam)
  - Second line: everything above this is “doing things for students” (e.g. providing solutions alongside exams)
- We often talk about proctoring in the context of integrity
- However, **proctoring is an accommodation**

# Remote proctoring: philosophy

- Exams are stressful
- Remote exams are not in-person exams
- Feeling of exam security is directly proportional to stress
- Stricter policies have diminishing returns compared to stress caused
- Consider how policy affects marginalized or vulnerable groups
- Onus should be on staff, not students (abstract as much as possible)
  - Instructions should be short
  - Presentation matters
  - Playtest instructions before publishing; give students time to react to rules
  - Students' focus should be on the exam, not the proctoring
- Tone is just as important as the policy itself
  - Avoid threatening students
  - Assume students are acting in good faith
- Students are entitled to privacy
  - Explicitly state who will view video feeds, and if recorded (not recommended), explicitly state how long videos will be stored, and where
  - Train staff to understand why this is important

# Accommodations

# [Guest slides: Vron]

Link to slides for DSP accommodations

# Exams

# Exams: why we need them

[class activity]

Why do we need exams? (please list at least two reasons)

# Why exams? (and grades, for that matter)

Exams evaluate students to differentiate them. There are two schools of thought for the reasoning:

- Extrinsic: you are being judged. Results are reported to external parties.
- Intrinsic: you are measuring yourself. Results are for you to know how well you did

# A thought experiment

- What if we got rid of grades?
- Companies/grad schools need a way to evaluate candidates
- Each institution creates its own interview
  - Too many interviews; now they create a screen (e.g. Triplebyte)
  - Candidates don't want to take a different screen for every single company
- Somehow wind up with grades again, just in the hands of for-profit institutions (think standardized tests)
- Can we do better?

# CS 375

Week 5: Academic dishonesty

# Self Reflection followup

- debug students, not their solutions
- reminder: block out your boardwork where possible
- post-midterms blues is a thing; be sure to reassure students! (but don’t lie); remember growth mindset
- people have settled into their “roles”; find the ones who want to talk, but don’t
- AIs giving lectures: rehearse first
- stay hydrated!

# Academic misconduct

# What is academic dishonesty?

“Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community”

# Academic misconduct

[class activity]

- Why do students cheat?
- Which situations are “clearly” cheating and which are borderline?
- What action to take when you suspect a student is cheating?
- What action to take when a student is caught cheating?

# Incentives vs mechanics

- How do you stop students from cheating?

- Making students not want to cheat vs making it harder for students to cheat
- Making it harder to cheat vs making it easier to detect cheating
- Protect those who are honest vs punish those who are dishonest

# A proposed framework

1. Remove incentives
2. Create “cheat-resistant” assessments
3. Create cheat detection mechanisms
    a. How will this affect non-cheating students?
4. Deal with actual detected cases of cheating

# Discussion #2

In your class, are there realistic ways you could:

- remove incentives to cheat?
- create “cheat-resistant” assessments?

What would the costs be (in TA time, complexity of administering exam, etc.)?

# Cheat-resistant assessments

- Open-book-style questions
  - higher in Bloom taxonomy
  - answers cannot be easily Googled
- Randomize order of questions (& choices, for MCQs)
  - all major LMSs do this, including bCourses and EECS Examtool
- Questions with randomizable parameters or "variants"
  - PrairieLearn is great for this, though nontrivial learning curve

# After-the-fact cheat detection (can’t observe student while answering question)

- Look at event timings for web-based exams (examtool; soon, PrairieLearn)
- Obviously similar patterns of wrong answers
  - eg Q-SID (shiny2.stat.ucla.edu/Q-SID)
  - Examtool

# Survey!

https://forms.gle/2RrVvum1847EobU88

# CS 375

Week 6: Accessible course content

# Announcements

- Second video observation due this week (this is the last non-makeup assignment)
  - You can simplify the template (or even free-form it) if that makes it easier to write
- Lecture attendance: make sure you are doing makeup assignments for days you missed
  - If you are concerned about attendance, feel free to email me

# Self Reflection/Survey followup

- Feedback has been positive!
- For negative feedback, try to get to the substance (and ignore any vitriol)
- Folks who give feedback are not necessarily the ones who benefit from the proposed changes
- Everyone wants less group work, more solutions
- [Imposter syndrome] writing exams
    - “everyone should know this, because *I* know this, and I’m not that smart”

# Accessibility: what is it?

“Ability for someone to use a service or tool”

# Accessible content

Generally, it means that anyone can use the content

In practice, this often means a list of things you have to keep track of

# Why is accessibility important?

1 in 5 Americans have a disability (from the US Census Bureau)

1 in 7, 1 in 8 are other common answers, 1 in 4 “adults”

1 in 3 above 65 (Uni. of New Hampshire)

This really depends on how you define disability and ask the question. Disability is situational, by time and location.

Bottom line: it’s a large number of people.

# Broad categories of disabilities

These do not cover all disabilities, but help you think about users of your applications.

- Auditory
- Cognitive, Neurological
- Visual (Blind and low vision)
- Physical (Motor control)
- Speech

https://www.w3.org/WAI/people-use-web/abilities-barriers/

# And also…

There are legal implications

- UCB was found in violation of the ADA by DOJ and removed 20,000 youtube videos

It also poses some interesting design and technical challenges

# Innovation in accessibility often benefits others too

Accessibility is not just for people with disabilities

Some innovations:

- Curb cuts
- Ramps
- Keyboard shortcuts
- Text messaging

https://99percentinvisible.org/episode/curb-cuts/

# In summary…

You likely benefit from accessible content, regardless of your circumstances

It’s worthy of an instructor to consider other people’s circumstances when designing content, systems, etc.

# Design vs. Remediation

Accessible by design
(especially for “born digital” content)

>>

Remediation after the fact

*What are some examples (or anti-examples) of “accessible by design” ?*

# Basic online resources

- Site visualizer: https://wave.webaim.org/
  - https://webaim.org/standards/wcag/checklist
  - ARIA:  Accesible Rich Internet Apps

- https://teachaccess.github.io/tutorial/#/2 (walkthrough)

# Make digital assets accessible by design

A11y (accessibility) hub mini-course: https://bcourses.berkeley.edu/courses/1477060/pages/formatting

A simple example

# What can I do?

If nothing else, follow the checklist:

- Campus-created checklist for accessibility (here is the README for it)

Class activity (assignment for those watching at home)

- Make a copy of the sheet
- Fill out either “Content” or “Keyboard” tab for your course’s website
  - Delete the other sections
- Your submission is a link to your (group’s) sheet, along with “1 interesting/unexpected thing you learned”, to piazza (list everyone in your group’s name)

# Other tools

tex4ht  - full TeX parser that outputs HTML rather than DVI

Microsoft Edge now has built-in ReadAloud (screen reader) and preview effects of visual features (text size/color/font, etc.)

Chrome extension *DarkReader* allows previewing a site in “Dark mode”

# This is just the beginning

We are not experts here (this exercise will not make you an expert)

Nobody knows HTML, but it’s kind of important

The DSP office, while able to audit resources, should not (and cannot) be the only place where accessibility is considered

# CS 375

Week 6: Making a boring topic interesting

# Preamble

- Don’t forget to link to your previous reflections
- Preparation is more important now than ever (topics are harder, you’re more tired)
- The rest of the classes will (probably) be shorter

# Boring topics

Disclaimer: today’s thoughts are my own (based on my experiences)

# How do you get people to care?

- Be excited! (but maybe you already know this)
- Find a way to make it:
  - understandable
  - quantifiable
  - relatable
- If people feel like they can master it, they are more likely to engage (gamification)
- Practical applications can help, but aren’t necessary

# Making “boring” topics engaging/presenting in an engaging manner

Binomial Distribution

*X* = number of heads after *n* coin flips of a coin with probability *p*

$$\Pr(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$$

Multinomial Distribution

*X* = number of 1s, …, ks after *n* rolls of a *k*-sided die with probability $p_1$, …, $p_k$

Pr[$x_1$ 1s, …, $x_k$ ks] = $$\frac{n!}{x_1! \cdots x_k!} p_1^{x_1} \cdots p_k^{x_k}$$

# What topics are you worried about?

[class activity]

- What is a topic in your class that (you're worried) is boring?
- What are some ways you can make it more approachable?
- What are some ways you can make it more interesting?
- Are there any practical applications for this topic?

# “But when will I ever use this?”

- Practical applications can be a double-edged sword
  - Pros: motivates the material, gives a way to apply material to the “real world”
  - Cons: can feel forced, (especially for intro courses) might not actually be practical
- The material should be able to stand on its own
- Fostering curiosity (in general) is key
  - after all, you never know when a piece of info will come in handy!
- “Students won’t really understand it if it’s just for the exam”?

# What if *I* don’t care?

- (Earlier advice) commiserate with your students
  - Example: continuous probability

# In closing

- Not everyone will agree on what's interesting
- Topics can only be boring in context
  - Specifically, how the material is contextualized is everything
- Opinions:
  - don't make it personal
    - "I don't like this" vs "you shouldn't like this"
  - be specific
    - "I enjoy this topic" vs "everyone loves this topic"
  - be explicit
    - "I think this is the best" vs "this is the best"

# CS 375

## Week 7: What is the point of your class?

CS 375 is filmed before a live studio audience.

Any resemblance to actual laughter (genuine or forced), or actual interactivity is purely coincidental. Someone probably just saw something funny on another tab or on their phone.

# Announcements

- Please double check that you have done all your assignments (we're almost there!)
  - Permissions for video observations have been updated
- [big scary threatening threat about catching up goes here]
- Last official class on Wednesday

# Self Reflection followup

- Attendance is going to be even worse here on out
- Arrange people in a (semi)circle if possible
- (From video feedback) people's presentations are much smoother now!
  - People's feedback is also fantastic!
- [Lab] giving walkthroughs after a certain point (adding more structure)

# What is the point of your class?

[class activity]

In 3 sentences/bullet points or less (fewer?), describe the purpose of the course you're teaching

# What is the point of your class?

- Why do classes get so inflated with material?
  - (aside) many self reflections note the sheer volume of new material in week 7
- Prerequisites: yes/no?
- Weeder classes

# CS 375

Week 7: Wrap up

# Announcements

- [Who is surprised] we are behind on grading

# Self Reflection followup

- Difficulty vs organization
- WE DID IT IT’S OVER (well, almost, anyway)